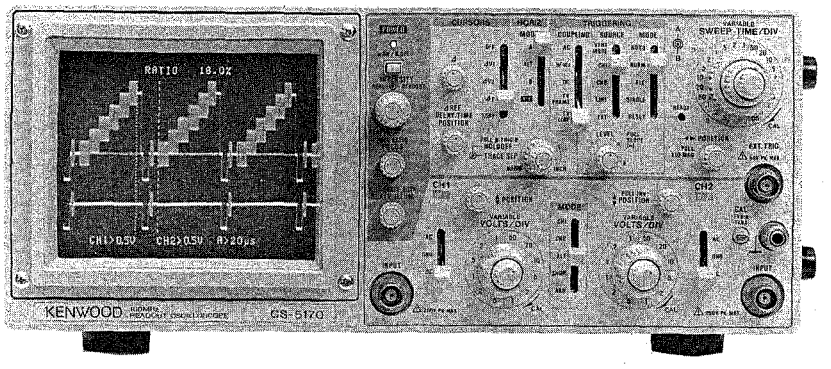
KENWOOD

100MHz READOUT OSCILLOSCOPE

CS-5170

SERVICE MANUAL



WARNING

The following instructions are for use by qualified personnel only. To avoid electric shock, do not perform any servicing other than contained in the operating instructions unless you are qualified to do so.

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SPECIFICATIONS

		CS-5170
CRT		150 mm rectangular with internal graticule
Acceleration Voltage		12 kV
Display Area		8×10 div (1 div=10 mm)
VERTICAL AXIS (CH1 and CH2)		
Sensitivity		1 mV/div to 5 V/div: 1 mV to 2 mV/div ±5%, 5 mV/div to 5 V/div ±3%
Attenuator		12 steps, 1 mV/div to 5 V/div in 1-2-5 sequence Vernier control for fully adjustable sensitivity between steps
Input Impedance		1 MΩ ±2%, approx. 30 pF
Frequency Response	DC	DC to 100 MHz, within −3 dB (5 mV/div to 5 V/div) DC to 20 MHz, within −3 dB (1 mV/div to 2 mV/div)
	AC	5 Hz to 100 MHz, within −3 dB (5 mV/div to 5 V/div) 5 Hz to 20 MHz, within −3 dB (1 mV/div to 2 mV/div)
Rise Time		3.5 ns (5 mV/div to 5 V/div) 17.5 ns (1 mV/div & 2 mV/div)
Signal Delay Time		Adequate to identify leading edge
Crosstalk		−40 dB or less (at 1 kHz)
Operating Modes	CH1	Single trace
	CH2	Single trace
	ALT	Two-waveform display, alternately
	CHOP	Two-waveform display, chopped
	ADD	CH1+(±CH2) added display
Chop Frequency		Approx. 300 kHz
Channel Polarity		Normal or inverted, channel 2 only inverted
Maximum Input Voltage		500 Vp-p or 250 V (DC+AC peak)
HORIZONTAL AXIS Input thru CH2, ×10 MAG not included		
Operating Modes		X-Y operation is selectable with HORIZ MODE switch CH1 : Y axis CH2 : X axis
Sensitivity		Same as vertical axis (CH2)
Input Impedance		Same as vertical axis (CH2)
Frequency Response	DC	DC to 1 MHz, within −3 dB
	AC	5 Hz to 1 MHz, within −3 dB
X-Y Phase Difference		3° or less at 100 kHz
⚠ Maximum Input Voltage		Same as vertical axis (CH2)
SWEEP		
Type	A	A sweep
	ALT	A sweep (intensified for duration of B sweep) and B sweep (delayed sweep) alternating
	B	Delayed sweep
	X-Y	X-Y oscilloscope operation
Sweep Time	A	0.05 μs/div to 0.5 s/div ±3%, in 22 ranges, in 1-2-5 sequence Vernier control for fully adjustable sweep time between steps
	B	0.2 μs/div to 50 ms/div ±3%, in 19 ranges, in 1-2-5 sequence
Sweep Magnification		×10 (ten times) ±5% (±8% in 0.05 μs-to-0.5 μs range)
Linearity		±3% (±5% for ×10 magnification)
Holdoff		Continuously variable from NORM to more than ten time (MAX)

SPECIFICATIONS

		CS-5170
Trace Separation		Shifts B sweep trace continuously in vertical direction by 4 divisions or more with respect to A sweep
Delayed Sweep		Continuous delay (AFTER DELAY) & triggered delay (B TRIG' D: triggered by A trigger)
Delay Time		Continuous adjustable from 0.2 μs/div to 0.5 s/div
Delay Accuracy		±(3% of set value + 1% of full scale) + (0 to 300 ns)
Delayed Jitter		10000 : 1 of decupled time axis A set value
TRIGGERING		
Modes		AUTO, NORM, FIX, & SINGLE-RESET
Trigger Source	VERT MODE	Triggered by input signal selected with vertical MODE selector
	CH1	Triggered by CH1 vertical signal
	CH2	Triggered by CH2 vertical signal
	LINE	Triggered by line frequency
	EXT	Triggered by external trigger signal
External Trigger Input Impedance		1 MΩ ± 2%, approx. 30 pF
⚠ MAX. EXT. Input Voltage		50 V (DC + AC peak)
Coupling		AC, HFREJ, DC, TV-FRAME, & TV-LINE
Trigger Sensitivity	At NORM position	
	AC	Trigger frequency range 10 Hz to 50 MHz (INT: 1 div, EXT: 0.15 Vp-p) 10 Hz to 100 MHz (INT: 1.5 div, EXT: 0.2 Vp-p)
	DC	Trigger frequency range DC to 50 MHz (INT: 1 div, EXT: 0.15 Vp-p) DC to 100 MHz (INT: 1.5 div, EXT: 0.2 Vp-p)
	HFREJ	Trigger frequency range is more than 50 kHz, and minimum amplitude (voltage) required for sync is increased.
	TV	FRAME, LINE INT: 1.5 div, EXT: 0.2 Vp-p
	AUTO: Same as above specifications for above 50 Hz	FIX: 50 Hz to 50 MHz (INT: 1.5 div, EXT: 200 mV) 50 Hz to 100 MHz (INT: 2.0 div, EXT: 250 mV)
CALIBRATION VOLTAGE		1 V p-p ± 3%, square wave, positive polarity, approx. 1 kHz
INTENSITY MODULATION		
Sensitivity		+ 5 V, positive voltage decreases brightness
Input Impedance		Approx. 10 kΩ
Usable Frequency Range		DC to 5 MHz
⚠ Maximum Input Voltage		50 V (DC + AC peak)
VERTICAL AXIS SIGNAL OUTPUT (CH1 only)		
Output voltage		Approx. 50 mVp-p/div (50 Ω termination)
Output Impedance		Approx. 50 Ω
Frequency Response		100 Hz to 100 MHz, − 3 dB/50 Ω termination (1 mV/div, 2 mV/div: 100 Hz to 20 MHz, − 3 dB)

SPECIFICATIONS

		CS-5170
READOUT		
Set Value		CH1/CH2 scale factor (with probe detection); V-UNCAL, ADD, INVERT A/B sweep scale factor (magnification conversion): SWEEP-UNCAL, AFTER DELAY, TRIG' D, X-Y
Cursor Mode A mode only	ΔV1	Voltage difference between ΔREF and Δcursors on a CH1 scale factor basis
	ΔV2	Voltage difference between ΔREF and Δcursors on a CH2 scale factor basis
	ΔT	Time difference between ΔREF and Δcursors on the basis of A sweep scale factor
	1/ΔT	Frequency between ΔREF and Δcursors on the basis of A sweep scale factor
		Ratio: Voltage and time ratio between ΔREF and Δcursors, supposing 5-division on the CRT as 100%
		Phase: Phase difference between ΔREF and Δcursors, supposing 5-division on the CRT as 360°
NOTE: The X-Y mode allows ΔV1 measurement only.		
Cursor Measurement	Resolution	10 bits
	Measurement accuracy	±4 %
	Measurable range	ΔV, Ratio: ±3.6 div or more from the CRT center ΔT, 1/ΔT, Ratio, Phase: ±4.6 div or more from the CRT center
TRACE ROTATION (Electrical, adjustable from front panel)		
POWER REQUIREMENT		
Line Voltage		AC 100 V/120 V/220 V ±10% 216V—250V
Line Frequency		50/60 Hz
Power Consumption		Approx. 59 W
DIMENSIONS (W×H×D)		319 (341)×132 (145)×380 (455) mm ( ) dimensions include protrusion from basic outline dimensions
WEIGHT		9.2 kg
ENVIRONMENTAL		
Within Specifications		10°C to 35°C, 85% max. relative humidity
Full Operation		0°C to 40°C, 85% max. relative humidity
ACCESSORIES SUPPLIED		
Probe		PC-31 (READOUT compatible probe)×2
	Attenuation	1/10
	Input impedance	10 MΩ, 22 pF ±10%
Replacement Fuse		1.2 A×2, 0.7 A×2
Instruction Manual		1

* Circuit and rating are subject to change without notice due to developments in technology.

SAFETY

SAFETY

Before connecting the instrument to a power source, carefully read the following information, then verify that the proper power cord is used and the proper line fuse is installed for power source. The specified voltage is shown at the fuse holder of the AC inlet. If the power cord is not applied for specified voltage, there is always a certain amount of danger from electric shock.

Line voltage

This instrument operates using ac-power input voltages that 100/120/220/240 V at frequencies from 50 Hz to 60 Hz.

Power cord

The ground wire of the 3-wire ac power plug places the chassis and housing of the oscilloscope at earth ground. Do not attempt to defeat the ground wire connection or float the oscilloscope; to do so may pose a great safety hazard. The appropriate power cord is supplied by an option that is specified when the instrument is ordered.
The optional power cords are shown as follows in Fig. 1.

Line fuse

The fuse holder is located on the rear panel and contains the line fuse. Verify that the proper fuse is installed by replacing the line fuse.

Voltage conversion

This oscilloscope may be operated from either a 100 V to 240 V, 50/60 Hz power source. Use the following procedure to change from 100 to 240 volt operation or vice versa.

1. Remove the fuse holder.
2. Replace fuse F 1 with a fuse of appropriate value, 1.2 amp for 100 VAC to 120 VAC operation, 0.7 amp for 220 VAC to 240 VAC operation.
3. Reinsert it for appropriate voltage range.
4. When performing the reinsertion of fuse holder for the voltage conversion, the appropriate power cord should be used. (See Fig. 1.)

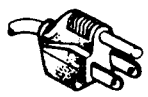
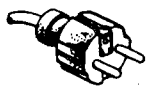
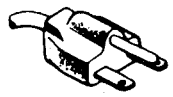
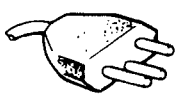
Plug configuration	Power cord and plug type	Factory installed instrument fuse	Line cord plug fuse	Parts No. for power cord and plate
	North American 120 volt/60 Hz Rated 15 amp (12 amp max; NEC)	1.2 A, 250 V Fast blow 6×30 mm	None	Cord: E30-1820-05
	Universal Europe 220 volt/50 Hz Rated 16 amp	North Europe 630 mA, 250 V Slow blow 5×20 mm Other Europe 0.7 A, 250 V Fast blow 6×30 mm	None	Cord: E30-1819-05
	U.K. 240 volt/50 Hz Rated 13 amp	0.7 A, 250 V Fast blow 6×30 mm	0.8 A Type C	—
	Australian 240 volt/50 Hz Rated 10 amp	0.7 A, 250 V Fast blow 6×30 mm	None	Cord: E30-1821-05
	North American 240 volt/60 Hz Rated 15 amp (12 amp max; NEC)	0.7 A, 250 V Fast blow 6×30 mm	None	—
	Switzerland 240 volt/50 Hz Rated 10 amp	0.7 A, 250 V Fast blow 6×30 mm	None	—

Fig. 1 Power Input Voltage Configuration

CIRCUIT DESCRIPTION

VERTICAL PREAMP CIRCUIT (X73-1830-00)

The signal for the input terminal CH1 or Y, CH2 or X is increased to the appropriate value by ATT and sent to the head amplifier Q2-Q5 (CH2: Q102-105). It is then sent to the cascade amplifier U2, Q6, Q7 (CH2: U102, Q106, Q107) through the GAIN switch unit (linked with the ATT) (1/1, 1/2, 1/4 and 1/10).

The feedback of the direct current is applied by the operation amplifier U1 (CH2: U101) to reduce the drift in the head amplifier.

The first cascade amplifier is a gain switch type amplifier. It increases the amplification degree 5X greater than the normal level within a range of 1 mV/div and 2 mV/div.

The signal from the first cascade amplifier is input to the diode gate D2-D5 (CH2: D102-D105 through the 2nd cascade amplifier Q8-Q11 (CH2:Q108-Q113).

The CH1 and CH2 signal is then sent to the delay line driver Q201 and Q202 selected by the V mode switch.

Q112 and Q113 of CH2 are used for current inversion.

TRIGGER SIGNAL CIRCUIT (X73-1830-00)

The signal output by CH1 and CH2 of the cascade amplifier emmitter is sent to the CH1 OUT/CH1 trigger pickoff amplifier Q12-Q15 and CH2 trigger pickoff amplifier Q114 - Q116 for the trigger signal. The signal amplified by CH1 and CH2 in the pickoff amplifier is sent to the H-unit trigger preamplifier by the P5 selected by the switching signal sent from the H-unit through P7.

The signal removed by the collector Q13 in the CH1 trigger pickoff amplifier Q13 passes through the emitter follower Q15 and is output by P1.

VERTICAL FINAL AMPLIFIER (X73-1840-00)

The signal sent through the delay line is terminated and amplified by the second level cascade amplifier Q1-Q9.

The signal that is converted to low impedance in the Q12 and Q13 of the emitter follower is amplified to the appropriate level so it can drive the CRT converter by the final amplifier Q14 - Q15.

READOUT Y-CHARACTER SIGNAL SWITCH CIRCUIT (X73-1840-00)

The Y-signal from the readout unit (X77-1510-01) and the request signal pass through the comparator Q103 and Q104 from P35 and are then sent to Q401 and Q102.

The gain from the Y-character signal and the center are determined, supplied to the vertical final amplifier Q3 and Q4 emmiter and drive the vertical final amplifier.

POWER SUPPLY CIRCUIT (X73-1830-00)

The power supply contains seven stabilized systems and two unstabilized systems. Stabilization is provided for +12 V and −12 V power supplies. There are two +5 V systems, one which is supplied to the oscilloscope unit and the other which is supplied to the readout unit (X77-1510-01) and the timing unit (X74-1500-00). Both +5 V systems are stabilized at −12 V. The +55 V and +145 V power supplies are stabilized at a reference voltage of −12 V. The +20 V power supply is stabilized at the #3 pin of U304. The power supply for the scale illumination circuit is ±18 V and the voltage rectified at D301 is sent to the H-unit scale illumination through P10. The +18 V voltage is supplied to the H-unit high-voltage oscillation circuit of the primary side through P10.

CAL CIRCUIT (X73-1830-00)

The oscillation circuit creates a 1-KHz square wave at the multivibrator using the 1/4 and 2/4 of the C-MOSIC U351. It then produces a square waveform at 3/4 and 4/4 of U351 and outputs a 1 Vp-p CAL signal from P9 using resistance separation.

TRIGGER CIRCUIT (X74-1500-00)

The trigger signal from the vertical system is sent from P4 to the source and coupling switches through the Q1 and Q2 signal comparator. It is added to the U1, Q7 and Q8 of the level comparator, which is the differential amplifier for the low impedance signal, by Q5, Q6 of the FET and the U1 emitter follower.

This signal is added to the Schmitt trigger by the buffer amplifier Q13 and Q15 through the slope switch and shaped as a square wave to operate the A and B sweep gate of the sweep circuit and the auto free-run circuit.

Q9 and Q10 are the error detection circuits for the FIX synchronization. The signal is amplified at U2, the mid-range voltage is removed and then the signal is sent to the Schmitt circuit.

Q11, Q12 and Q14 and U3 4/4 are the synchronization signal separation circuits for the television signal. The X-signal for the X-Y operation is obtained from the CH2 trigger pickoff and added to the horizontal amplifier Q202 (X73-1840-00) through the Q19, Q20 and Q21 output circuits.

HORIZONTAL SWEEP CIRCUIT (X74-1500-00)

If the trigger pulse is added to the flip-flop U102 1/2, the output is transfered, and the mirror integration circuit configured at Q104 - Q109 and U103 starts the sweep.

The sweep length for this sweep signal is determined at Q114 and the flip-flop U102 2/2. After a break time determined by Q111, Q112 and Q113 of the hold-off circuit, the trigger signal is obtained again.

The output from the U102 1/2 flip-flop is transfered for the B-sweep after a delay determined by the voltage from the delay pick-off comparator Q213-Q216 and the delay time position.

The sweep signals from both the A-sweep and the B-sweep are switched by the the H-mode switch, U104 and U203 of the horizontal switching circuit and added to the horizontal amplifier Q302.

CIRCUIT DESCRIPTION

HORIZONTAL AMPLIFIER CIRCUIT (X73-1840-00)

The sweep signal of the sweep circuit is added to Q201 to Q204 of the drive amplifier. The gain X1 and X10 are selected at this time. The power supply amplification signal is switched to the voltage signal at Q205 and Q206 and amplified to an adequate level to drive the CRT deflection board by the high amplification ratio and low output impedance of the final amplifier Q207 to Q214.

READOUT X CHARACTER SIGNAL SWITCH CIRCUIT (X73-1840-00)

The X-signal from the readout unit (X77-1510-01) and the request signal pass through the comparator Q107 and Q108 from P36 and are sent to the Q105 and Q106 of the switching amplifier.

The character signal gain and the gain center are determined at this time, supplied to the base of Q205 and Q206 of the horizontal amplifier and drive the horizontal final amplifier.

The final voltage is converted to high voltage by D408 and D409 of the direct voltage reproduction circuit and is the drive for the primary anode electrode.

The − 1500 V cathode electrode drive voltage is formed at the DC-DC converter by the control circuit U401 and blocking oscillator Q409.

The third electrode voltage forms the secondary coil voltage of the DC-DC converter for the 7X voltage rectification.

READOUT Z-AXIS SIGNAL SWITCH CIRCUIT (X73-1830-00)

The blanking signal from the readout unit (X77-1510-01) ends at P37 and is added to U501. The pulse width output signal from the R517 and C502 timing is sent to the Z-axis input.

The unblanking signal ends Q505 and Q506 from P37 and is sent to the Z-axis input.

This signal passes through the operating amplifier U502 and is sent for the readout off signal to the readout unit from P37.

TRACE ROTATION AND SCALE ELIMINATION CIRCUITS (X73-1830-00)

The trace rotation circuit drives the rotator coil that is positioned at the CRT cone by the voltage from the common emitter phase correction transistor Q410 and Q411.

The scale elimination circuit performs the optical volume adjustment at Q412.

R/O UNIT (X77-1510-01)

The readout unit functions include the three features described below.

1) Import unit
   This unit imports the data for each switch for the CRT readout display. (This consists of U17-U24 in the IC).
2) Display unit
   This forms the X-axis and Y-axis for the CRT readout display. (This includes the U1-U5, U7, U8, U13, and R33 of each IC and the voltage).
3) Cursor unit
   This includes of A/D converter and caclulator for the cursor measurement.
   (This includes U6, U8-U11, U14, U23 of the IC.)

Import unit

This unit imports data for each switch operation. A one-chip MPU U23 transfers the data to the character generator (U7). A reference clock is provided from a 10-MHz oscillator that uses U16 and X1.

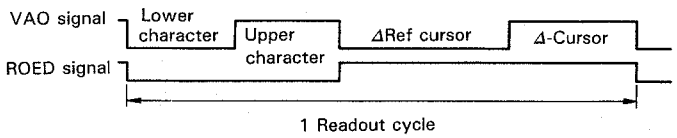
The A0 - A7 low order addresses are output to the data bus by time assignment. U18 latches the low order addresses by the ALE signal output from the MPU.

The switch data necessary for the monitor display is imported to the MPU every 80 ms through the I/O port of U19 - U22. U17 is output by the I/O port decoder and the output signal RS0-RS3 is output in 80 ms cycles.

Display unit

The character display is controls the character generator U7 by the character counter (U8 DC1-CD7) and the dot counter (U8 DC0-DC4) using the random scan method (X-Y display).

The readout display is performed in 13.5 ms for each cycle. One cycle of the readout display is separated into four parts, low characters, high characters, the ΔREF cursor and the Δ-Cursor. The timing is then switched by pins U8-89 of the ROED signal and pins U8-U16 of the VA0 signal.



5 × 7 dot configuration character data is input to the character generator U7.

The three bits DD0 - DD2 are X-axis data and the four bits DD3 - DD6 are Y-axis data. DD7 is the character start and end control bit.

The digital signal output from U7 is converted to each analog signal by the data converter U1 for the X-axis signal, V33 and R33 and the D/A converter for the Y-axis signal configured by U3 and R33. The X-axis and Y-axis signals are sent through analog switch U4 and U5 and U13 of the buffer amplifier to the final unit (X73-1840-00).

The character dot display is controlled by the ROUB signal (U8-86 pin), ROB signal (U8-87 pin) and the ROQ signal (U8-88 pin).

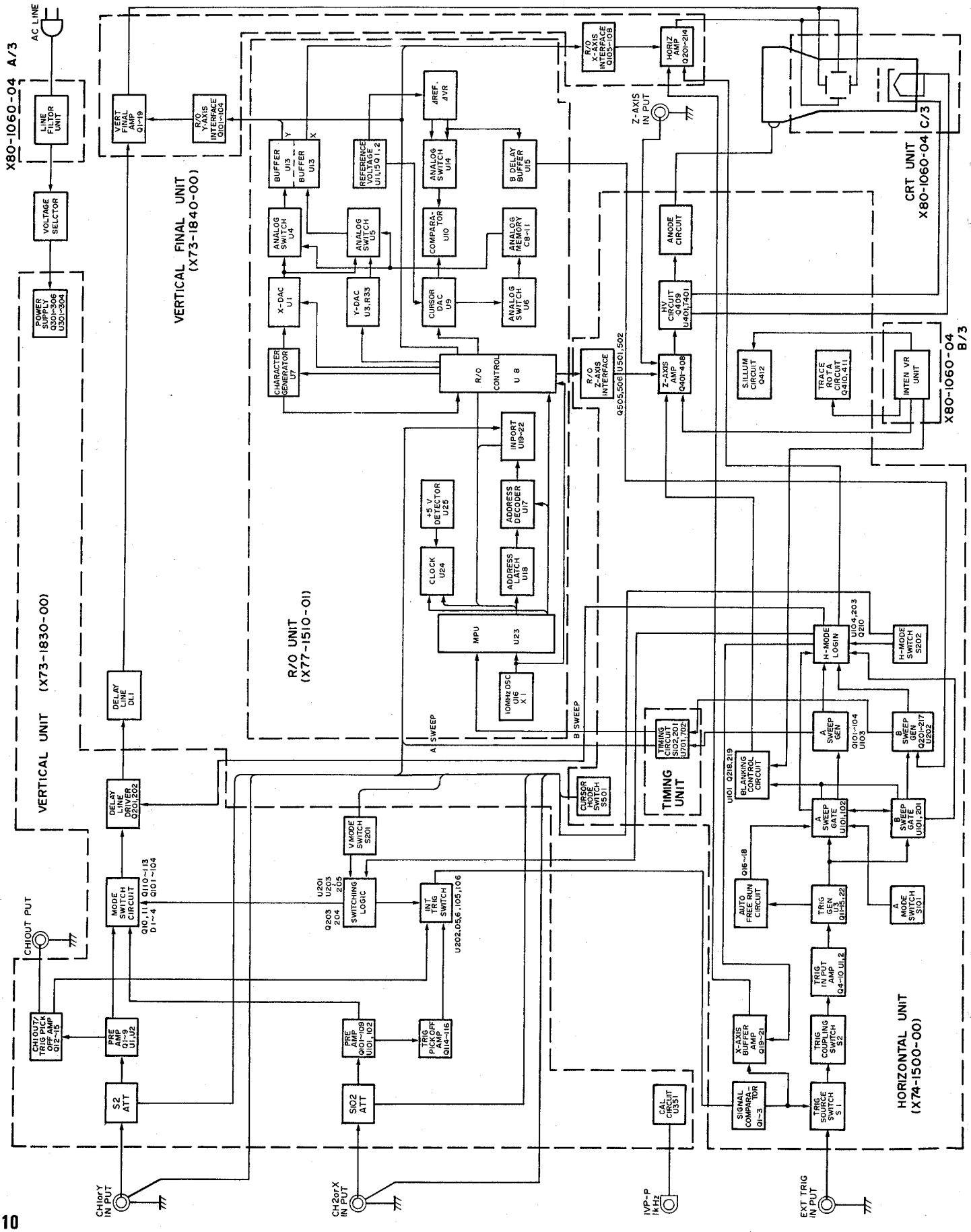
CIRCUIT DESCRIPTION

The real waveform display is cleared by the ROB signal, the real waveform and the readout switch are performed by the ROQ signal and the readout dot display is performed by the ROUB signal.
The three signals described above are controlled by the ROSP signal in pin 83 of U8 (readout off signal $\overline{\text{R/O OFF}}$).

Cursor Unit

The ±1.25 V cursor reference voltage is formed by the low-resistance separation of the +10 V power supply voltage and output through U11, U15, Q1 and Q2. This ±1.25 V corresponds to the full scale voltage of the 10-bit separation function of the cursor measurement.
The voltage set by the cursor VR is sent directly to the analog switch U14 for the X-axis measurement and reduced 80% for the Y-axis measurement. U14 performs the ΔT and ΔV switching and the ΔREF and Δ-Cursor switching.
The MPU U23 sends the 10-bit data to the D/A converter U9 where the data is converted to analog voltage. The converter U10 compares the voltage from analog voltage and the cursor VR and returns the output to MPU U23.
U8, U9, U10 and U23 obtained by this process configure the A/D converter. This A/D converter converts the analog voltage from the ΔREF and Δ-Cursor VR to 10-bit digital data. The conversion speed for the A/D converter is 80 ms.
Next, the MPU performs the cursor calculations using this converted 10-bit digital data. The analog voltage output from the D/A converter U9 is converted to the ΔREF and Δ-Cursor by analog switch U6 and is maintained in each hold circuit every 80 ms for the hold voltage.

BLOCK DIAGRAM



ADJUSTMENT

To obtain the best performance, periodically calibrate the unit. Sometimes, only one mode need be calibrated, while at other times, all modes should be calibrated. When one mode is calibrated, it must be noted that the other modes may be affected. When calibrating all modes, perform the calibration in the specified sequence.
The following calibration required an accurate measuring instrument and an insulated adjusting flat blade screwdriver. If they are not available, contact your dealer. For optimum adjustment, turn the power on and warm up the scope sufficiently (more than 30 minutes) before starting.
Before calibrating the scope, check the power supply voltage.

TEST EQUIPMENT REQUIRED

The following instrument or their equivalent should be used for making adjustment.

Test Equipment	Model	Minimum Specification
Digital Multi-Meter	DL-711 (KENWOOD)	Impedance: More than 10 MΩ, Measuring range: 0.01 V to 199 V
Sine-Wave Generator	651 B (YHP)	Frequency: 10 Hz to 10 MHz, constant voltage over tuning range
Sine-Wave Generator	SG-503 (Tektronix)	Frequency: 50 kHz to 100 MHz, Output impedance: 50 Ω, constant voltage over tuning range
Square-Wave Generator	PG-506 (Tektronix)	Output signal: 1 kHz, Amplitude: 10 mVp-p to 10 Vp-p, Accuracy: within ±1%, Rise time: 35ns or less 100 kHz, Rise time: 1 ns or less
Q Meter	4343B (YHP)	—
Color Pattern Generator	CG-911A (KENWOOD)	—
Oscilloscope	475A (Tektronix)	Sensitivity: more than 5 mV Frequency response: More than 250 MHz
Time-Marker Generator	TG-501 (Tektronix)	Time mark: 0.5 s to 0.1μs repetive waveform
High-Voltage Probe	—	Input Impedance: 1000 MΩ
Termination	—	Impedance: 50 Ω Accuracy: within 3%
Termination	—	3 watts type impedance: 50 Ω
Attenuator	—	– 20 dB attenuation (50 Ω)

Table 1

PREPARATION FOR ADJUSTMENT

Control Settings

The control settings listed below must be used for each adjustment procedure.
Exceptions to these settings will be noted as they occur. After completing a adjustment, return the controls to the following settings.

NAME OF KNOBS	POSITION
INTEN	12 o'clock
FOCUS, ASTIG	Optimum position
CH1, CH2 ▲▼ POSITION	Mechanical center
CH1, CH2 STORAGE POSI	Mechanical center
◄► POSITION/PULL ×10MAG	Mechanical center, push
VARIABLE, H.VARIABLE (VOLTS/DIV, SWEEP TIME/DIV)	CAL
AC-GND-DC (CH1 and CH2)	DC (GND at no signal)
Vertical MODE	CH1
CH2 PULL INV	Push (NORM)
TRIGGERING COUPLING	AC
TRIGGERING SOURCE	CH1
TRIGGERING LEVEL	Mechanical center, push
TRIGGERING MODE	AUTO
VOLTS/DIV (CH1 and CH2)	5 mV/DIV
A, B SWEEP TIME/DIV	1 ms/DIV
TRACE SEP	Fully CCW
HOLDOFF	Fully CCW, NORM, Push
HORIZONTAL MODE	A
DELAY TIME POSITION	Optimum position

Table 2

ADJUSTMENT

1. POWER SUPPLY AND CRT SECTION ADJUSTMENTS

Item	Adjustment VR (TC)	P.C.B.	Procedure
+12 V	VR301	X73-1830	Adjust VR301 so that the voltage at pin 5 of the connector P14 is +12 V.
CRT Center	VR2	X73-1840	By CH2 posi, locate a point at which luminance line does not move on the PULL and PUSH setting of CH2 INV. Keep CH2 posi as it is, and adjust VR2 to center on the screen.
Vertical Center Voltage	VR5	X73-1840	Adjust VR5 so that the voltage between CRT socket pin "9" and GND is 37 V. * CRT socket pin "9" refers to titanium oxide porcelain capacitor C5.
Focus Center	VR402	X74-1500	Push the FOCUS knob in (for the FOCUS operation) and then set it to the mechanical center position. Pull the knob out (for the ASTIG operation), display a spot on the screen, and adjust the ASTIG control and VR402 to minimize the dimension of the spot.
B Intensity	VR403	X74-1500	Turn fully counterclockwise
Intensity	VR401	X74-1500	Display the spot on the CRT screen, and adjust VR401 so that the spot disappears when the INTEN knob is set to the 10-o'clock position.

2. VERTICAL SECTION ADJUSTMENTS

Item	Adjustment VR (TC)	P.C.B.	Procedure
CH1 Waveform Shaping	TC2 TC4	X73-1830	AC-GND-DC : DC Apply 10 kHz square wave to CH1 INPUT (with the amplitude extending over 4 to 6 div). Set CH1 VOLTS/DIV to 0.1 V range (and 1 V range), and adjust TC2 (and TC4) so that the waveform becomes flat in both ranges.
CH2 Waveform Shaping	TC102 TC104	X73-1830	Adjust in the same way as for CH1.
CH1 Input Capacity	TC1 TC3	X73-1830	AC-GND-DC : DC CH1 VOLTS/DIV : 5 mV Connect the capacity meter to the CH1 INPUT, and measure the input capacity in the 5 mV range. Adjust TC1 and TC3, alternately, so that the input capacity in the 0.1 V and the 1 V ranges equals the same capacity as in the 5 mV range.
CH2 Input Capacity	TC101 TC103	X73-1830	Adjust in the same way as for CH1.
CH1 Step ATT Balance	VR1 VR2	X73-1830	Adjust VR1 so that the position of the luminescent line does not change even when the vertical attenuator is selected between 5 and 10 mV range. Switch the range between 2 and 5 mV ranges, and perform the same adjustment using VR2.
CH1 Variable Balance	VR7	X73-1830	VOLTS/DIV : 5 mV Adjust VR7 so that the position of the luminescent line does not change even if the VARIABLE knob is rotated.

ADJUSTMENT

Item	Adjustment VR (TC)	P.C.B.	Procedure
CH2 Step ATT Balance	VR101 VR102	X73-1830	Adjust in the same way as for CH1.
CH2 Variable Balance	VR107	X73-1830	Adjust in the same way as for CH1.
CH1 Position Center	VR9	X73-1830	CH1 POSITION : Mechanical center position CH1 VOLTS/DIV : 5 mV Adjust VR9 so that the trace is located on the center of the screen.
CH2 Position Center	VR109	X73-1830	Adjust in the same way as for CH1.
ADD position	VR201	X73-1830	Set the channel 1 and channel 2 position controls so that the trace is located on the center of the screen and select the vertical MODE switch to ADD position. Adjust VR201 to center the trace vertically.
CH1 Gain	VR10	X73-1830	CH1 VOLTS/DIV : 10 mV Input a square wave signal having an amplitude of 50 mV, and adjust VR10 so that the CRT amplitude becomes 5 div.
CH1 1 mV Range Gain	VR4	X73-1830	CH1 VOLTS/DIV : 1 mV Input a square wave signal having an amplitude of 5 mV, and adjust VR4 so that the CRT amplitude becomes 5 div.
CH2 Gain	VR110	X73-1830	Adjust in the same way as for CH1.
CH2 1 mV Range Gain	VR104	X73-1830	Adjust in the same way as for CH1.
X Gain	VR3	X74-1500	CH2 VOLTS/DIV : 10 mV HORIZONTAL MODE : X-Y Input the square wave signal having an amplitude of 50 mV into CH2 INPUT, and adjust VR3 so that the CRT amplitude in the horizontal direction becomes 5 div.
TRIG. SLOPE	VR2	X74-1500	TRIGGERING MODE : AUTO TRIGGERING SOURCE : CH1 TRIGGERING COUPLING : AC CH1 VOLTS/DIV : 5 mV Input a sinewave signal of 1 KHz frequency and 6 DIV amplitude into CH1 INPUT. Sychronize by TRIG. LEVEL knob Change the TRIG. SLOP from "+" to "−", and adjust by VR2 knob so that the start point becomes same as the "+".

ADJUSTMENT

3. TRIGGER SECTION ADJUSTMENTS

Item	Adjustment VR (TC)	P.C.B.	Procedure
Trigger Level Center	VR1	X74-1500	TRIGGERING MODE : AUTO SOURCE : CH1 COUPLING : AC LEVEL : Mechanical center position SLOPE : + Input a 1 kHz sine wave into CH1 INPUT, and adjust the oscillator so that the CRT amplitude becomes 6 div. Adjust VR1 so that start point of the luminescent line is at the center of the CRT (vertical direction).
CH1 Trigger DC Coupling	VR11	X73-1830	After adjusting the trigger level center, set the TRIGGERING COUPLING to the DC position. Adjust VR11 so that the start point of the luminescent line is at the same position as in the AC mode.
CH2 Trigger DC Coupling	VR111	X73-1830	TRIGGERING MODE : AUTO SOURCE : CH2 COUPLING : AC CH2 VOLTS/DIV : 5 mV Input a 1 kHz sine wave to CH2 INPUT, and adjust the oscillator so that the CRT amplitude becomes 6 div. Adjust the TRIGGERING LEVEL so that the start point of the luminescent line is at the center of the CRT. Set the TRIGGERING COUPLING to the DC position. Adjust VR111 so that the start point of the luminescent line is at the same position as in the AC mode.

4. HORIZONTAL SECTION ADJUSTMENTS

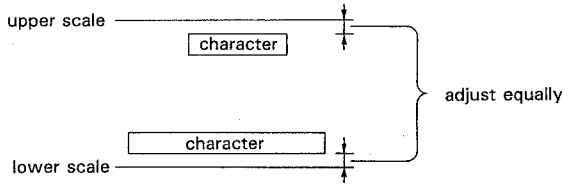
Item	Adjustment VR (TC)	P.C.B.	Procedure
B Sweep Start Point	VR204	X74-1500	HORIZONTAL MODE : ALT A and B SWEEP TIME/DIV: 1 ms Adjust VR204 to coinside the start point of B sweep with that of A sweep.
1 ms Range Sweep Time	VR101 VR201	X74-1500	SWEEP TIME/DIV : 1 ms Input a 1 ms marker signal into CH1 INPUT. Adjust VR101 and VR201 so that the peak of the marker signal matches the CRT scale divided in 1 div.
1 μs Range Sweep Time	TC101 TC201	X74-1500	SWEEP TIME/DIV : 1 μs Input a 1 μs marker signal into CH1 INPUT, and adjust in the same way as for 1 ms adjustment.
$\times$10 MAG Gain	VR202	X74-1840	HORIZONTAL MODE : A A SWEEP TIME/DIV : 1 ms Input a 1 ms marker signal into CH1 INPUT, and match the peak of the marker signal with the CRT scale divided in 1 div. Pull the PULL $\times$10 MAG knob (to set to the $\times$10 MAG status), and adjust VR202 so that the interval between peaks becomes 10 div.
$\times$10 MAG Center	VR201	X74-1840	A SWEEP TIME/DIV : 1 ms Input a 5 ms marker signal into CH1 INPUT. Pull the PULL $\times$10 MAG knob (to set to the $\times$10 MAG status), and adjust the horizontal POSITION so that the peak of the waveform is at the vertical scale line at the center of the CRT. Push the PULL $\times$10 MAG knob (to release the $\times$10 MAG mode) and adjust VR201 so that the peak of the waveform matches the vertical scale line at the center of the CRT.

ADJUSTMENT

Item	Adjustment VR (TC)	P.C.B.	Procedure
Delay Time Position	VR203 VR202	X74-1500	HORIZONTAL MODE : ALT A SWEEP TIME/DIV : 0.1 ms B SWEEP TIME/DIV : 1 μs Turn the DELAY TIME POSITION knob until you have [DELAY 0.030 ms] on the screen. Adjust to 0.3 DIV by VR203 knob. Then, turn the DELAY TIME POSITION knob to have [DELAY 0.980 ms] on the screen. Adjust to 9.8 DIV by VR203 knob. * Repeat for any other values.
X Position Center	VR4	X74-1500	Adjust the horizontal POSITION knob so that the sweep start point moves to the vertical scale line at the left end of CRT. Switch to the X-Y mode and adjust VR4 to bring the spot to the center of CRT screen.

ADJUSTMENT

5. CURSOR SECTION ADJUSTMENT

Item	Adjustment VR (TC)	P.C.B.	Procedure
Cursor Y Gain and Position	VR101 VR102	X73-1840	CURSORS : ΔV1 Δ : Turn fully clockwise ΔREF : Turn fully counterclockwise Adjust VR101 so that the interval between cursors becomes 8 div. Adjust VR102 so that the two cursors move to the upper and lower ends of the horizontal scale line in the CRT. If it is impossible, adjust the interval between cursors and the horizontal scale line becomes the same for both upper and lower ends.
R/O CHARACTER Position	VR2	X77-1510	Use VR2 to adjust the read out characters so that they have same distance from that upper and lower scales of the screen. 
Cursor X Gain and Position	VR103 VR104	X73-1840	CURSORS : ΔT Δ : Turn fully clockwise ΔREF : Turn fully counterclockwise Adjust VR103 so that the interval between two cursors becomes 10 div. Adjust VR104 so that the two cursors move onto the vertical scale lines at the left the right ends of CRT.
R/O Cursor Length	VR1	X77-1510	CURSORS : ΔV1 Adjust VR1 to bring the left end of the cursor on the vertical scale line at the first division to the right of the left side of CRT screen.
CHARACTER	VR203	X73-1840	CURSORS : ΔT A SWEEP TIME/DIV : 2μs X10 MAG : ON Adjust VR203 until the cursor and characters stop vibrating horizontally.

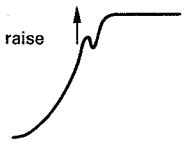
ADJUSTMENT

6. OVERSHOOT AND CAL ADJUSTMENTS

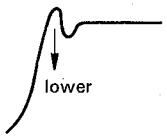
<table>
<tr><th>Item</th><th>Adjustment VR (TC)</th><th>P.C.B.</th><th>Procedure</th></tr>
<tr><td rowspan="2">Overshoot Adjustment</td><td><For CH1>
TC108
VR108
TC107
VR105
TC105
VR103
TC106

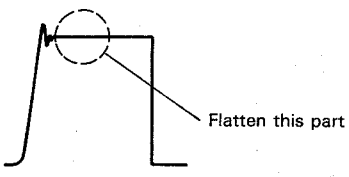
<For CH2>
VR8
TC8
TC7
VR5
TC5
VR3
TC6</td><td>X73-1830</td><td rowspan="2">CH1, 2 VOLTS/DIV : 5 mV
CH1, 2 AC-GND-DC : DC
SWEEP TIME/DIV : 0.2 μs
Input a square wave signal of 1 MHz frequency and 6 DIV amplitude into CH1 INPUT.

Turn the VOLUME knob fully clockwise.
VR6 (final unit)
VR3, 103 (vertical unit)

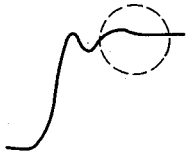
Turn the VOLUME knob fully counterclockwise.
VR1, 3, 4 (final unit)
Turn the VOLUME knob halfway. VR8 (vertical unit)
Obtain as high as possible overshoot by TC4 (final unit)
 

• Obtain as high as possible overshoot by TC7 (vertical unit) (when using X10MAG. The wave distortion becomes minimum)

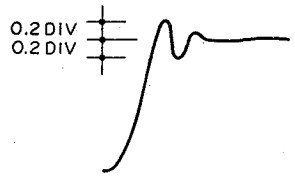
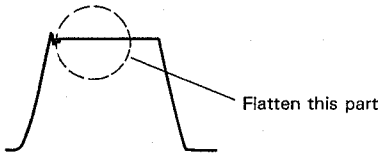
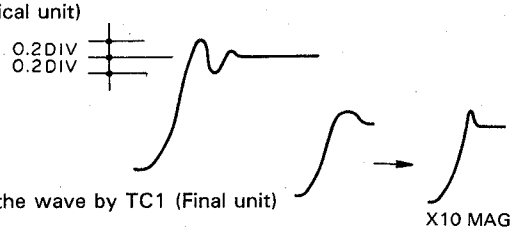
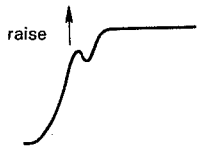
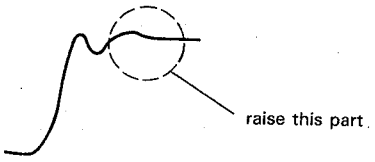
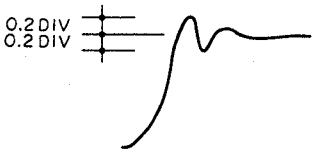
• Obtain as low as possible overshoot by TC1 (final unit) (when using X10MAG)
 

• Flatten the delay part by TC3 (final unit)
 

Set the SWEEP TIME/DIV on 0.05 μs

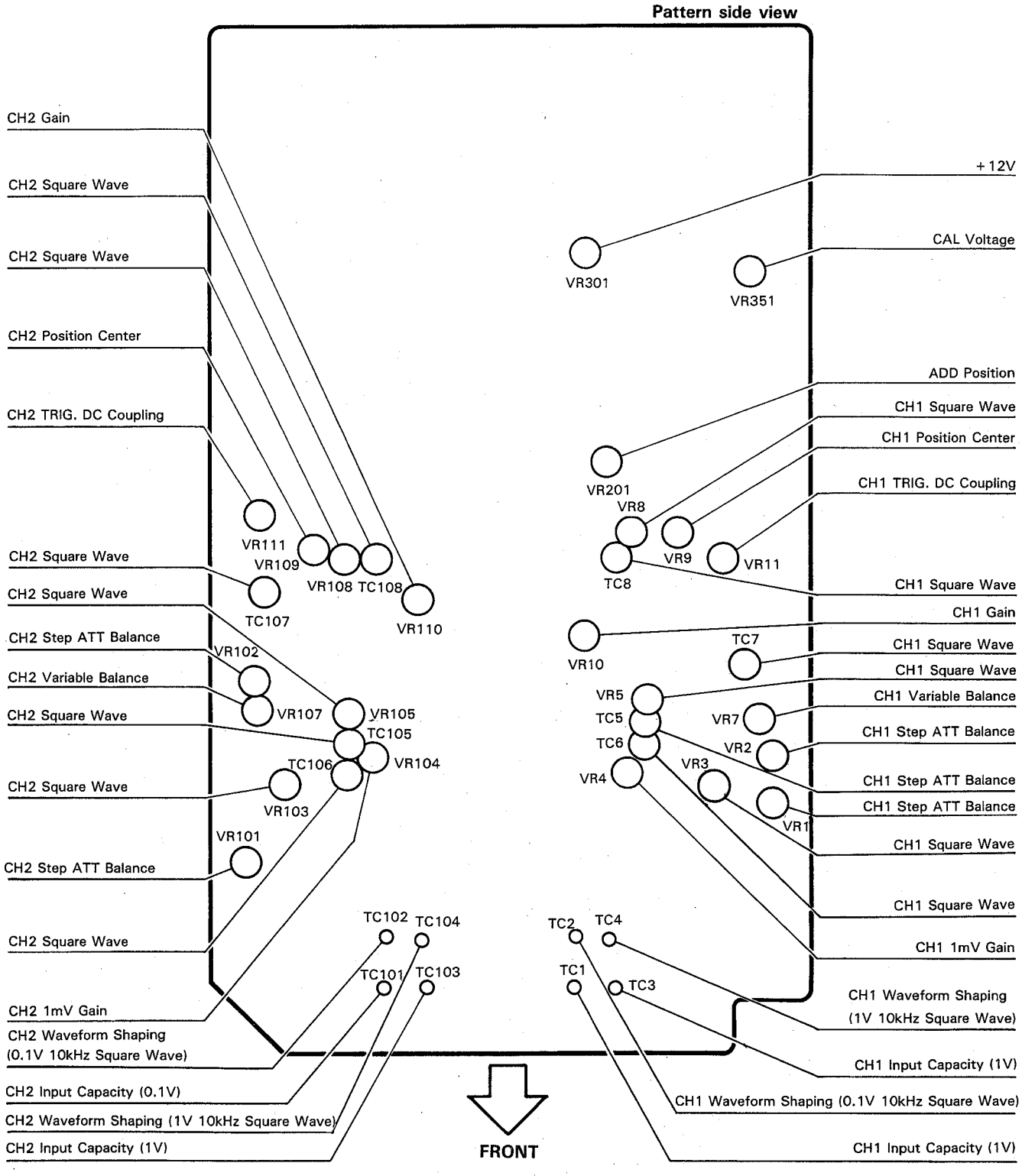
• Flatten the middle part by TC8 (vertical unit)
  </td></tr>
<tr><td>TC4
VR6
VR4
TC3
TC1
VR1
TC2
VR3</td><td>X73-1840</td></tr>
</table>

ADJUSTMENT

Item	Adjustment VR (TC)	P.C.B.	Procedure
			• Get an overshoot by TC5 (vertical unit) VR5  Set the SWEEP TIME/DIV on 0.2 μs • Flatten the delay part by VR3, TC3 (final unit)  Set the SWEEP TIME/DIV on 0.05 μs • Confirm the setting of the overshooting and readjust if necessary. TC5, 6, VR5 (vertical unit)  • Adjust the top of the wave by TC1 (Final unit) Input a square wave signal of 1 MHz frequency and 6 div amplitude into CH2 INPUT. • Obtain as high as possible overshoot by TC107 (vertical unit)  • Raise the wave as high as possible by TC108 (vertical unit)  • Use VR108 (vertical unit) to flatten the part which is moved by TC108. • Get an overshoot by TC105, 106, VR105 (vertical unit) 
CAL Adjustment	VR351	X73-1830	Connect the oscilloscope to the CAL terminal and set it to 0.2 V/div. Adjust VR351 so that the amplitude is of 5 divisions for 40 MHz input.

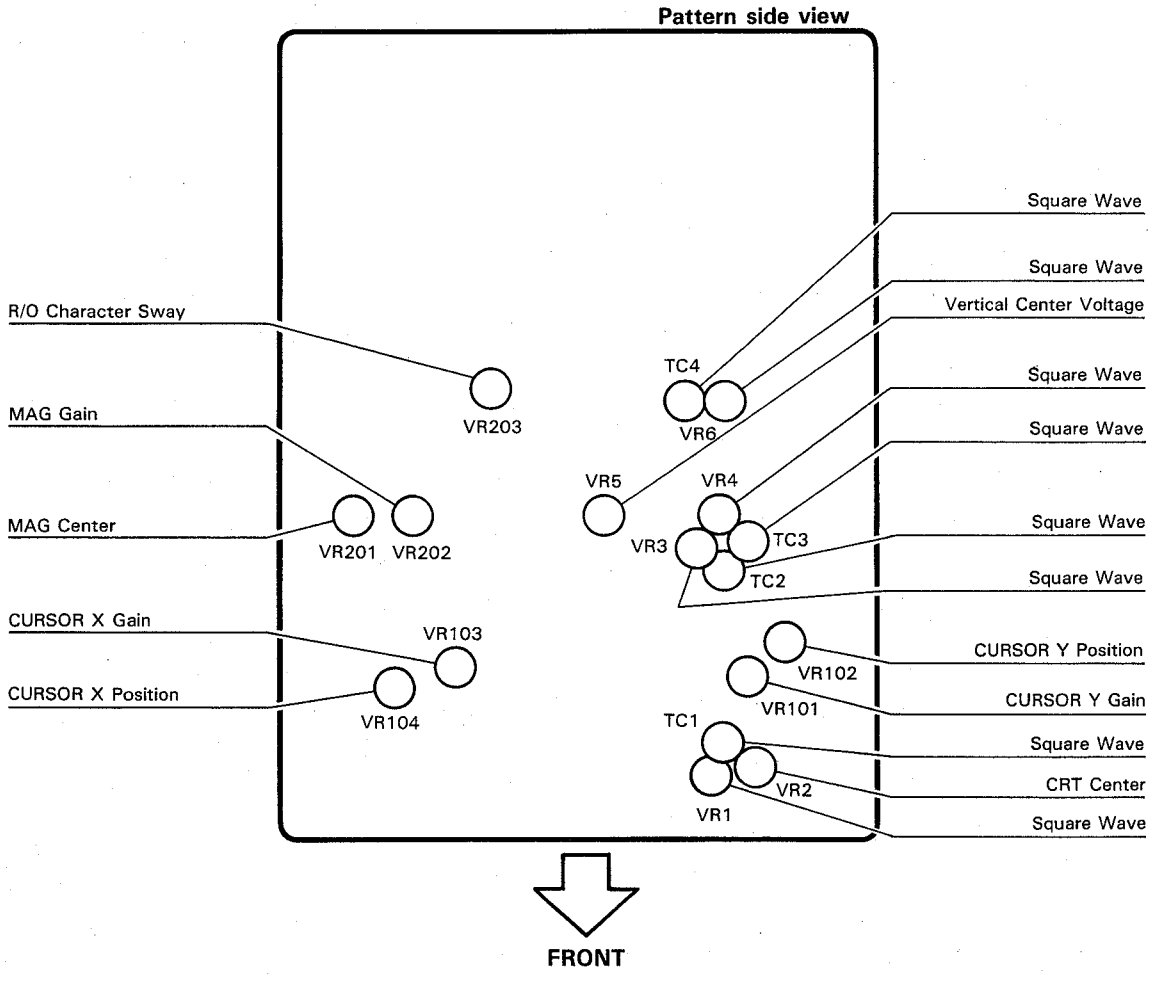
ADJUSTMENT

VERTICAL UNIT (X73-1830-00)



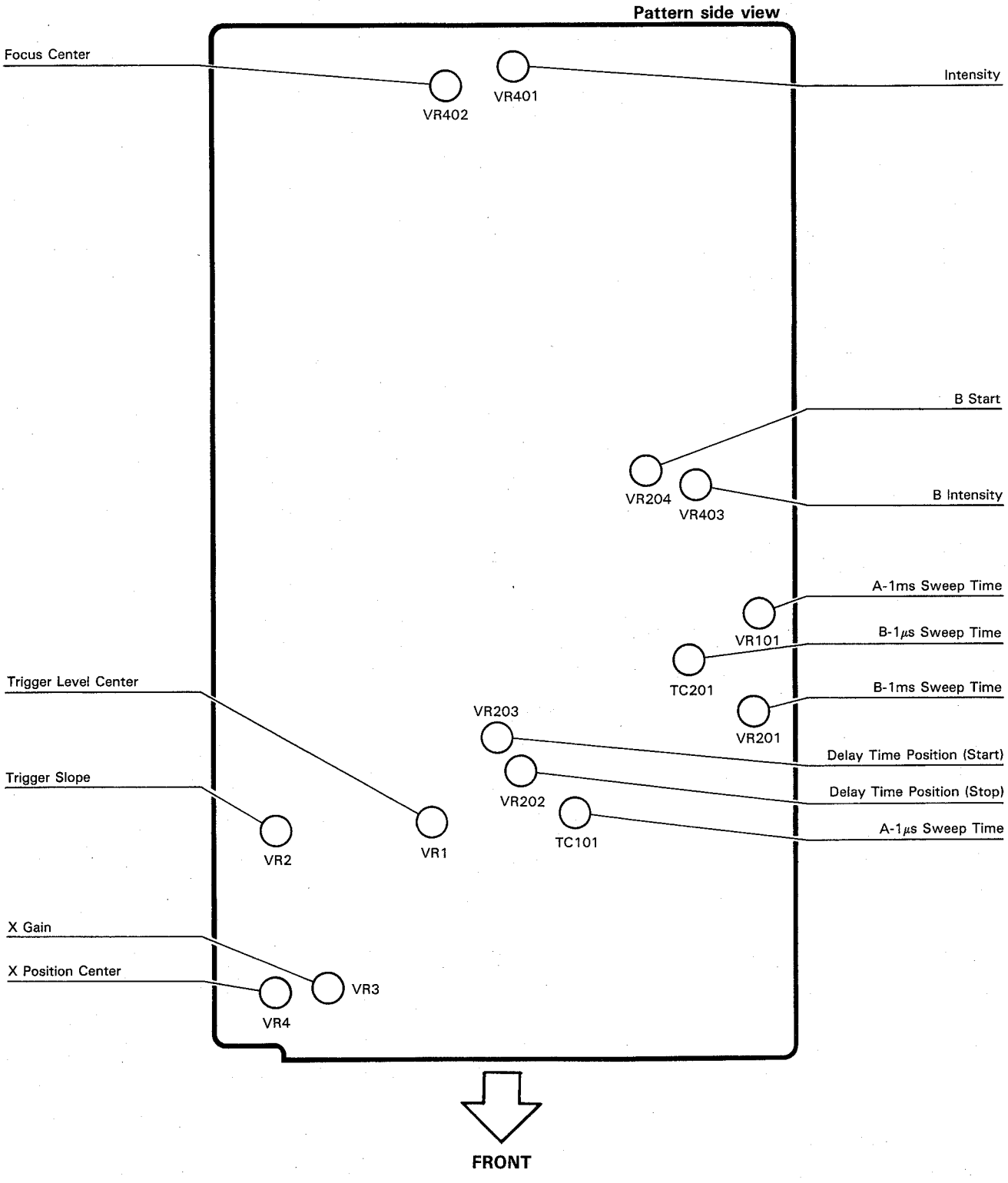
ADJUSTMENT

VERTICAL FINAL UNIT (X73-1840-00)



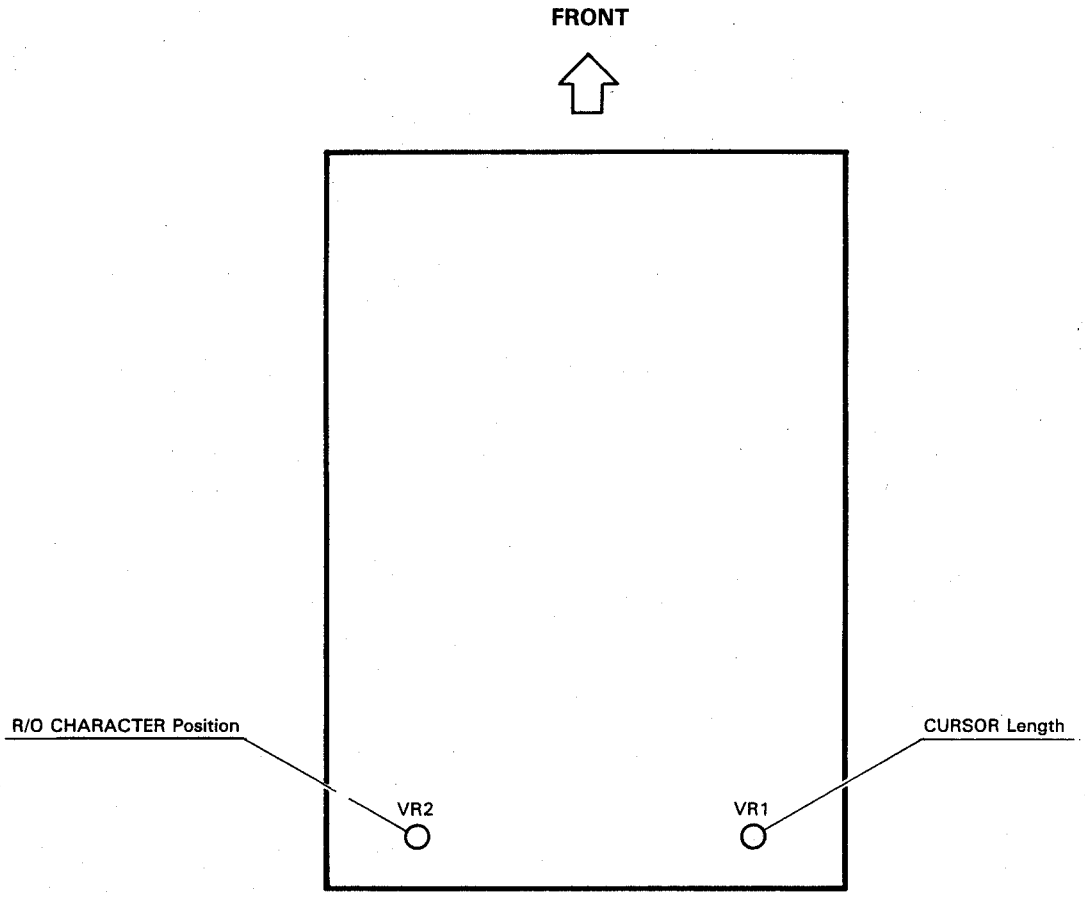
ADJUSTMENT

HORIZONTAL UNIT (X74-1500-00)



ADJUSTMENT

R/O UNIT (X77-1510-01)



TROUBLESHOOTING

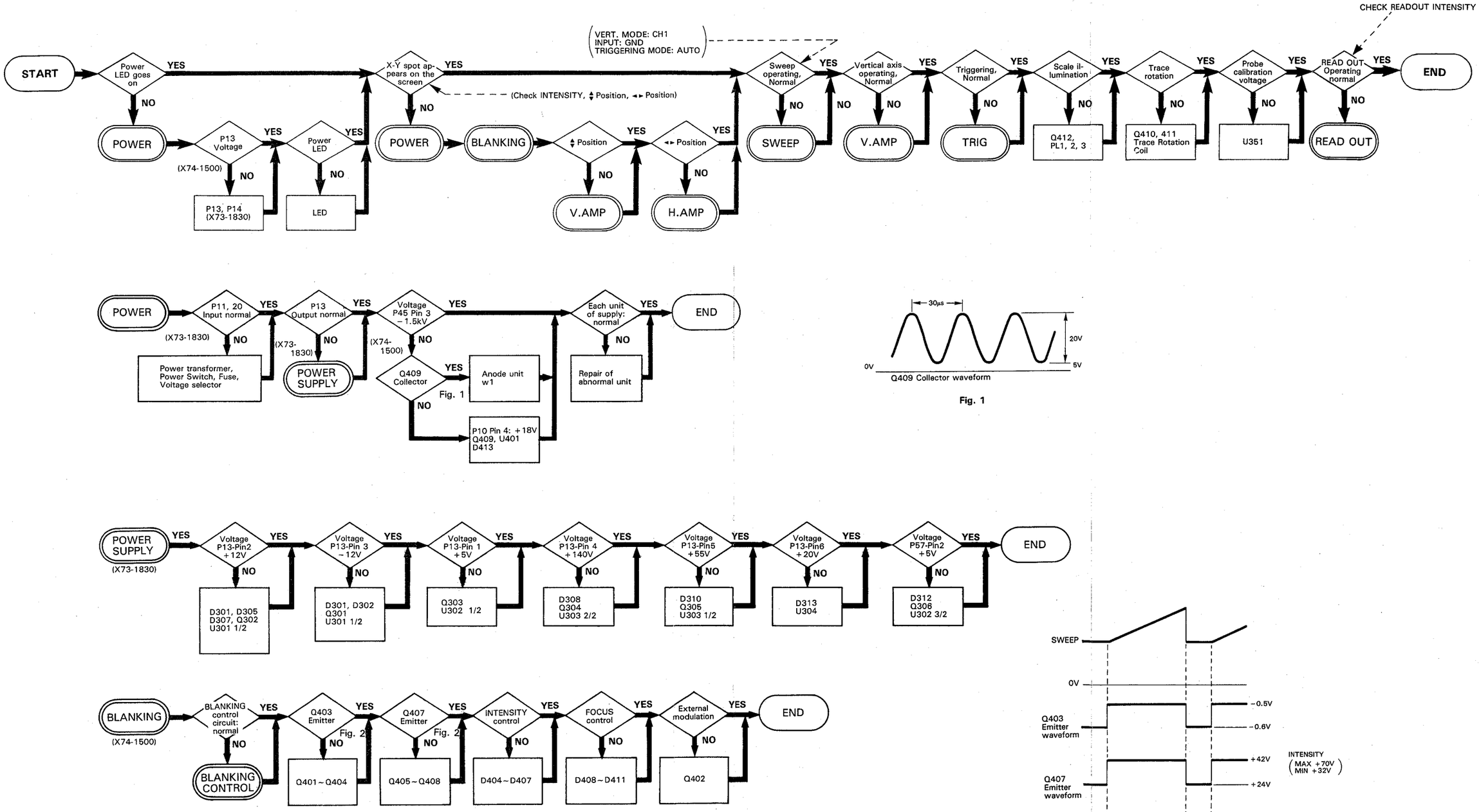


Fig. 1

Fig. 1

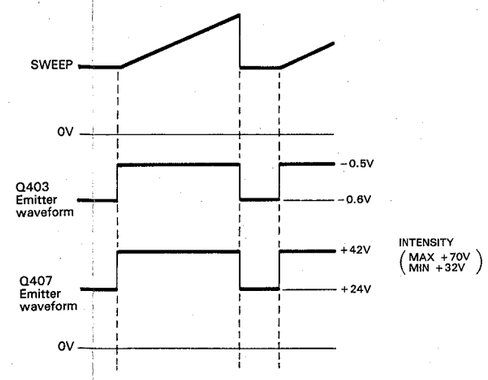
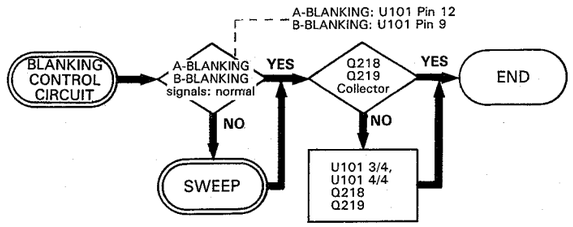
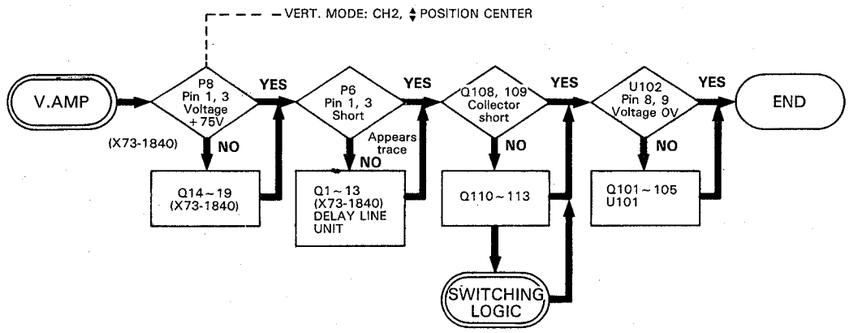


Fig. 2

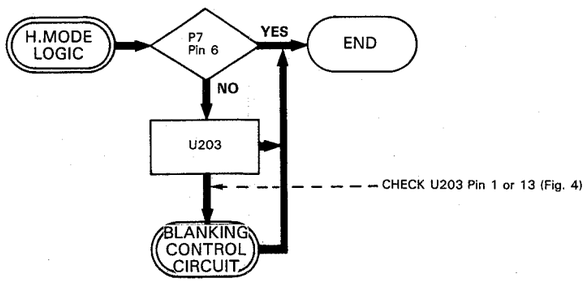
TROUBLESHOOTING





VERT MODE	U201 Pin 1	U201 Pin 7
CH1	H	H
CH2	L	L
ALT	CH1 CH2	CH1 CH2
CHOD	CH1 CH2	CH1 CH2
ADD	L	H

Fig. 3



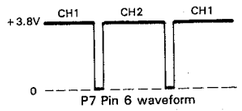
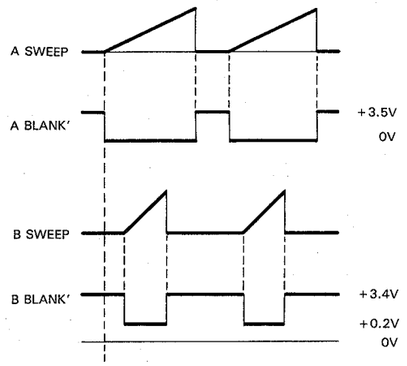
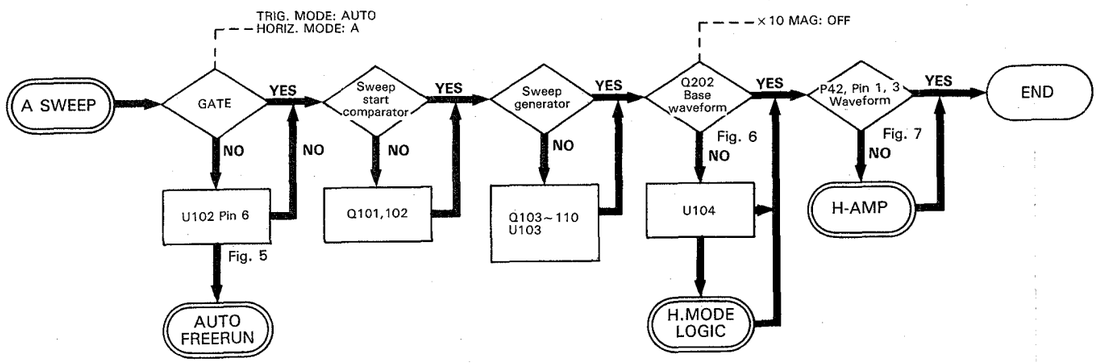
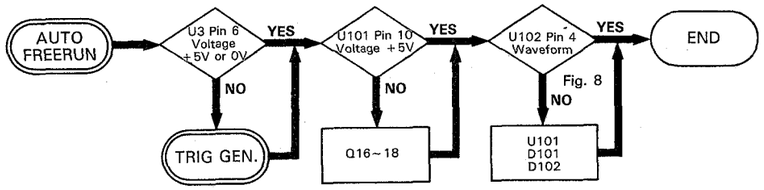


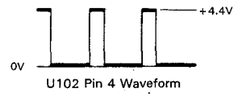
Fig. 4



TROUBLESHOOTING

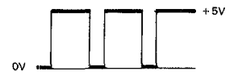






U102 Pin 4 Waveform

Fig. 8



U101 Pin 9 Waveform

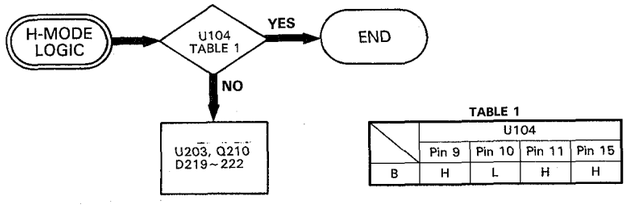
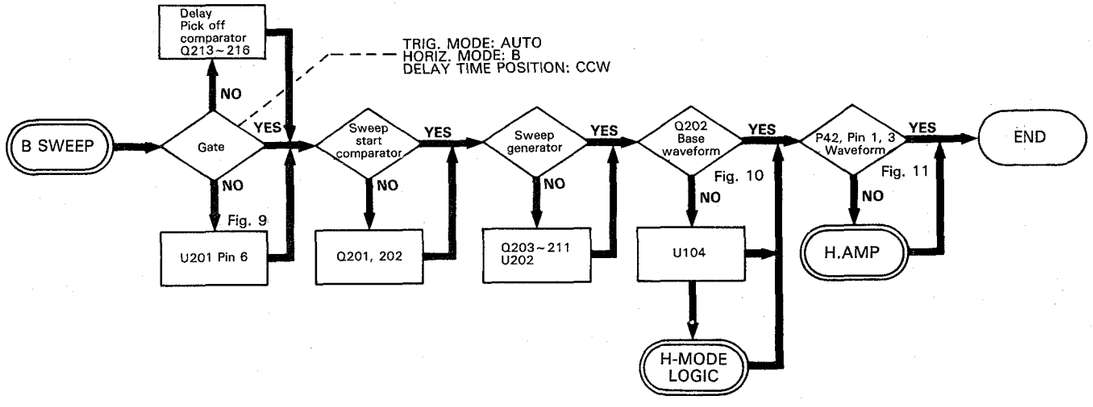
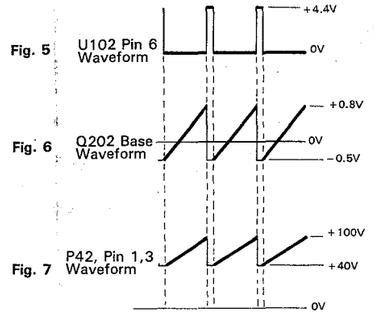
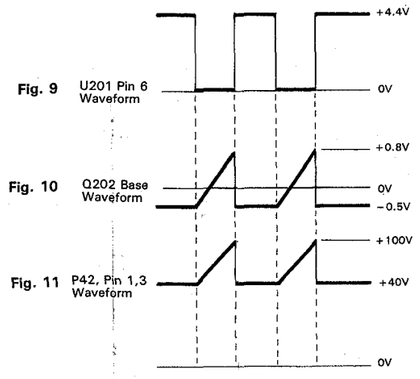


TABLE 1

	U104			
	Pin 9	Pin 10	Pin 11	Pin 15
B	H	L	H	H







TROUBLESHOOTING

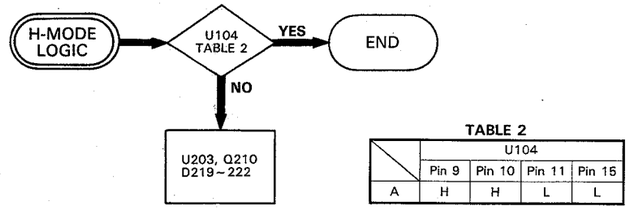
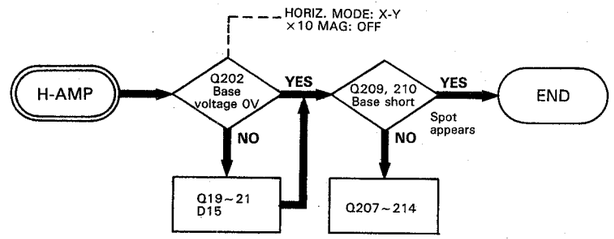
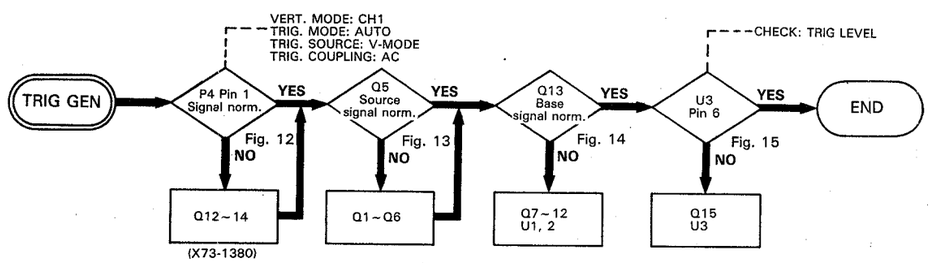


TABLE 2

	U104			
	Pin 9	Pin 10	Pin 11	Pin 15
A	H	H	L	L





(X73-1380)

Fig. 12

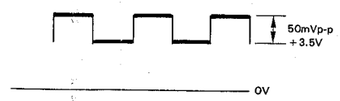


Fig. 13

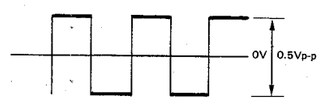


Fig. 14

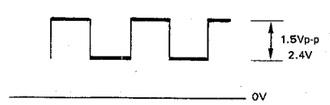
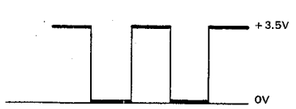
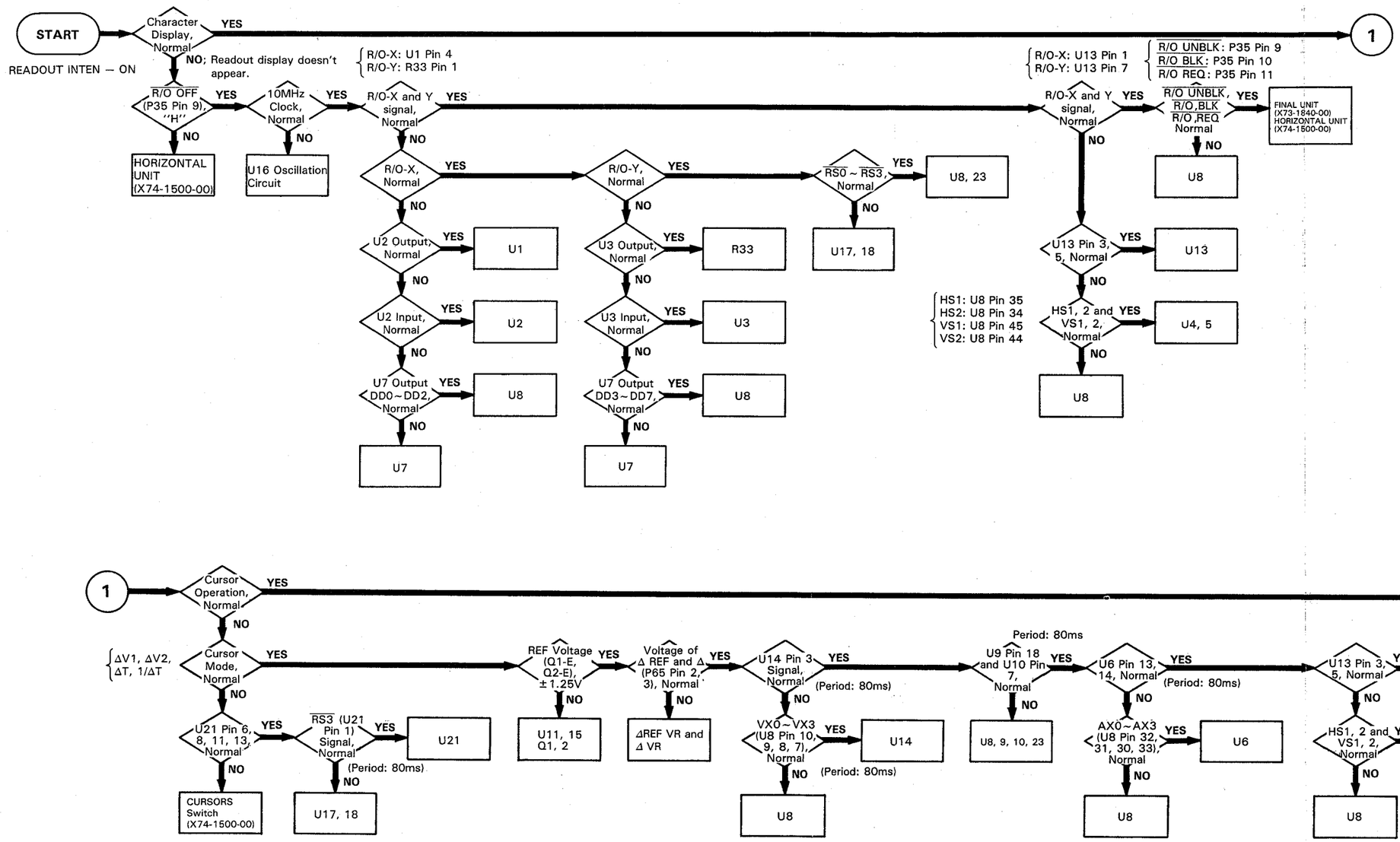
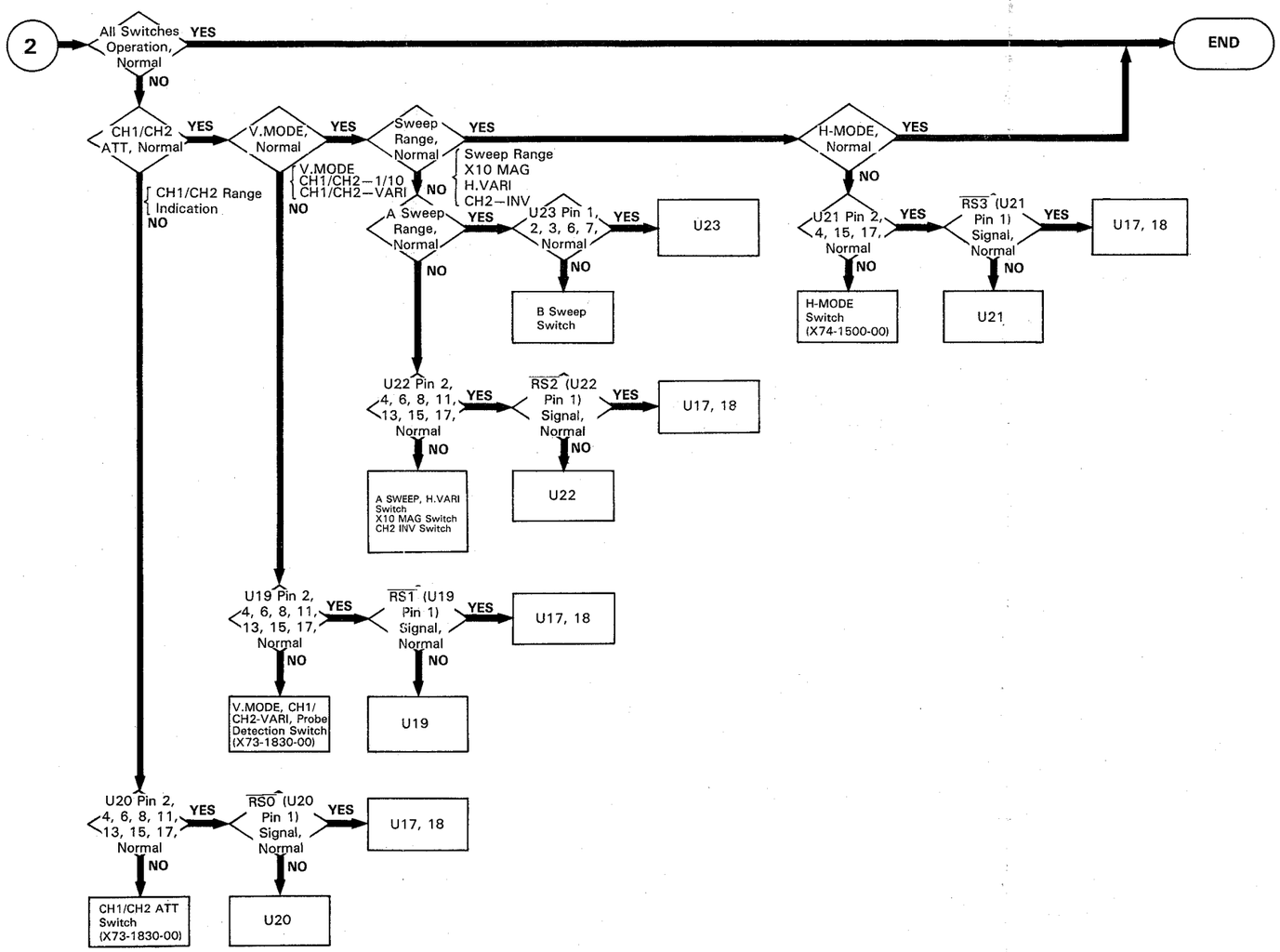


Fig. 15



READOUT SECTION
R/O UNIT (X77-1510-01)




2
All Switches Operation, Normal
YES
END
NO
CH1/CH2 ATT, Normal
YES
V.MODE, Normal
YES
Sweep Range, Normal
YES
H-MODE, Normal
YES
CH1/CH2 Range Indication
NO
V.MODE
CH1/CH2—1/10
CH1/CH2—VARI
NO
Sweep Range
X10 MAG
H.VARI
CH2—INV
NO
A Sweep Range, Normal
YES
U23 Pin 1, 2, 3, 6, 7, Normal
YES
U23
NO
B Sweep Switch
U21 Pin 2, 4, 15, 17, Normal
YES
RS3 (U21 Pin 1) Signal, Normal
YES
U17, 18
NO
H-MODE Switch (X74-1500-00)
U21
U22 Pin 2, 4, 6, 8, 11, 13, 15, 17, Normal
YES
RS2 (U22 Pin 1) Signal, Normal
YES
U17, 18
NO
A SWEEP, H.VARI Switch X10 MAG Switch CH2 INV Switch
U22
U19 Pin 2, 4, 6, 8, 11, 13, 15, 17, Normal
YES
RS1 (U19 Pin 1) Signal, Normal
YES
U17, 18
NO
V.MODE, CH1/CH2-VARI, Probe Detection Switch (X73-1830-00)
U19
U20 Pin 2, 4, 6, 8, 11, 13, 15, 17, Normal
YES
RS0 (U20 Pin 1) Signal, Normal
YES
U17, 18
NO
CH1/CH2 ATT Switch (X73-1830-00)
U20

TROUBLESHOOTING

READOUT SIGNAL TABLE

(1) CH1 (CH2) Vertical Attenuator

VOLTS/DIV	U20 Pin 13 (17) "ATT3"	U20 Pin 6 (2) "ATT2"	U20 Pin 11 (15) "ATT1"	U20 Pin 8 (4) "ATT0"	Display
1 mV	1	1	1	1	CH1 (CH2) 1 mV
2 mV	1	1	1	0	CH1 (CH2) 2 mV
5 mV	1	1	0	1	CH1 (CH2) 5 mV
10 mV	1	1	0	0	CH1 (CH2) 10 mV
20 mV	1	0	1	1	CH1 (CH2) 20 mV
50 mV	1	0	1	0	CH1 (CH2) 50 mV
0.1 V	1	0	0	1	CH1 (CH2) 0.1 V
0.2 V	1	0	0	0	CH1 (CH2) 0.2 V
0.5 V	0	1	1	1	CH1 (CH2) 0.5 V
1 V	0	1	1	0	CH1 (CH2) 1 V
2 V	0	1	0	1	CH1 (CH2) 2 V
5V	0	1	0	0	CH1 (CH2) 5 V

(2) CH1 (CH2) Vertical Gain VARIABLE

V. VARIABLE	U19 Pin 8 (11) "CH1 (CH2)/VARI"	Display
CAL	1	Space
UNCAL	0	>

(3) CH1 (CH2) Probe

Probe	U19 Pin 6 (13) "CH1 (CH2)/PROBE"	Display
1/1	1	VOLTS/DIV ×1 Indication
1/10	0	VOLTS/DIV ×10 Indication

(4) CH2 Polarity

Polarity (PULL INV)	U22 Pin 17 "CH2/INV"	Display
Normal	1	Space
Invert	0	↓

(5) Vertical MODE

MODE	U19 Pin 17 "V.MODE 3"	U19 Pin 2 "V.MODE 2"	U19 Pin 15 "V.MODE 1"	U19 Pin 4 "V.MODE 0"	Display
CH1	1	1	1	1	CH1
CH2	1	1	1	0	CH2
ATL	1	1	0	1	CH1 CH2
CHOP	1	0	1	1	CH1 CH2
ADD	0	1	1	1	CH1 + CH2

(6) A Sweep Range

SWEEP TIME/DIV	U22 Pin 4 "SWEEP 4"	U22 Pin 13 "SWEEP 3"	U22 Pin 6 "SWEEP 2"	U22 Pin 11 "SWEEP 1"	U22 Pin 8 "SWEEP 0"	Display
0.5 s	1	1	1	0	0	A: 0.5 s
0.2 s	1	1	0	1	1	A: 0.2 s
0.1 s	1	1	0	1	0	A: 0.1 s
50 ms	1	1	0	0	1	A: 50 ms
20 ms	1	1	0	0	0	A: 20 ms
10 ms	1	0	1	1	1	A: 10 ms
5 ms	1	0	1	1	0	A: 5 ms
2 ms	1	0	1	0	1	A: 2 ms
1 ms	1	0	1	0	0	A: 1 ms
0.5 ms	1	0	0	1	1	A: 0.5 ms
0.2 ms	1	0	0	1	0	A: 0.2 ms
0.1 ms	1	0	0	0	1	A: 0.1 ms
50 μs	1	0	0	0	0	A: 50 μs
20 μs	0	1	1	1	1	A: 20 μs
10 μs	0	1	1	1	0	A: 10 μs
5 μs	0	1	1	0	1	A: 5 μs
2 μs	0	1	1	0	0	A: 2 μs
1 μs	0	1	0	1	1	A: 1 μs
0.5 μs	0	1	0	1	0	A: 0.5 μs
0.2 μs	0	1	0	0	1	A: 0.2 μs
0.1 μs	0	1	0	0	0	A: 0.1 μs
50 ns	0	0	1	1	1	A: 50 ns

(7) Horizontal Magnification

Magnification (PULL ×10 MAG	U22 Pin 15 "H-MAG"	Display
Normal	1	SWEEP TIME/DIV ×1 Indication
×10 MAG	0	SWEEP TIME/DIV ×1/10 Indication

(8) Sweep Time VARIABLE

H.VARIABLE	U22 Pin 2 "H-VARI"	Display
CAL	1	Space
UNCAL	0	>

(9) Horizontal MODE

H.MODE	U21 Pin 4 "X-Y"	Display
Sweep	1	Space
X-Y	0	X-Y

(10) Cursor MODE

CURSORS	U21 Pin 13 "CURSOR-MODE 3"	U21 Pin 6 "CURSOR-MODE 2"	U21 Pin 11 "CURSOR-MODE 1"	U21 Pin 8 "CURSOR-MODE 0"	Display
OFF	1	1	1	1	No Cursor Line
ΔV1	1	1	1	0	Two Horizontal Cursor Lines
ΔV2	1	1	0	1	Two Horizontal Cursor Lines
ΔT	1	0	1	1	Two Vertacal Cursor Lines
1/ΔT	0	1	1	1	Two Vertical Cursor Lines

B Sweep Range

SWEEP TIME/DIV	U23 Pin 7 "SWEEP 4"	U23 Pin 6 "SWEEP 3"	U23 Pin 3 "SWEEP 2"	U23 Pin 2 "SWEEP 1"	U23 Pin 1 "SWEEP 0"	Display
50 ms	1	1	0	0	1	B: 50 ms
20 ms	1	1	0	0	0	B: 20 ms
10 ms	1	0	1	1	1	B: 10 ms
5 ms	1	0	1	1	0	B: 5 ms
2 ms	1	0	1	0	1	B: 2 ms
1 ms	1	0	1	0	0	B: 1 ms
0.5 ms	1	0	0	1	1	B: 0.5 ms
0.2 ms	1	0	0	1	0	B: 0.2 ms
0.1 ms	1	0	0	0	1	B: 0.1 ms
50 μs	1	0	0	0	0	B: 50 μs
20 μs	0	1	1	1	1	B: 20 μs
10 μs	0	1	1	1	0	B: 10 μs
5 μs	0	1	1	0	1	B: 5 μs
2 μs	0	1	1	0	0	B: 2 μs
1 μs	0	1	0	1	1	B: 1 μs
0.5 μs	0	1	0	1	0	B: 0.5 μs
0.2 μs	0	1	0	0	1	B: 0.2 μs
0.1 μs	0	1	0	0	0	B: 0.1 μs
50 ns	0	0	1	1	1	B: 50 ns

PARTS LIST

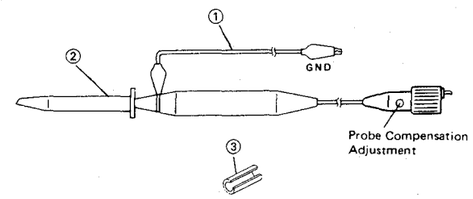
CS-5170 UNIT

(Y70-1670-00)

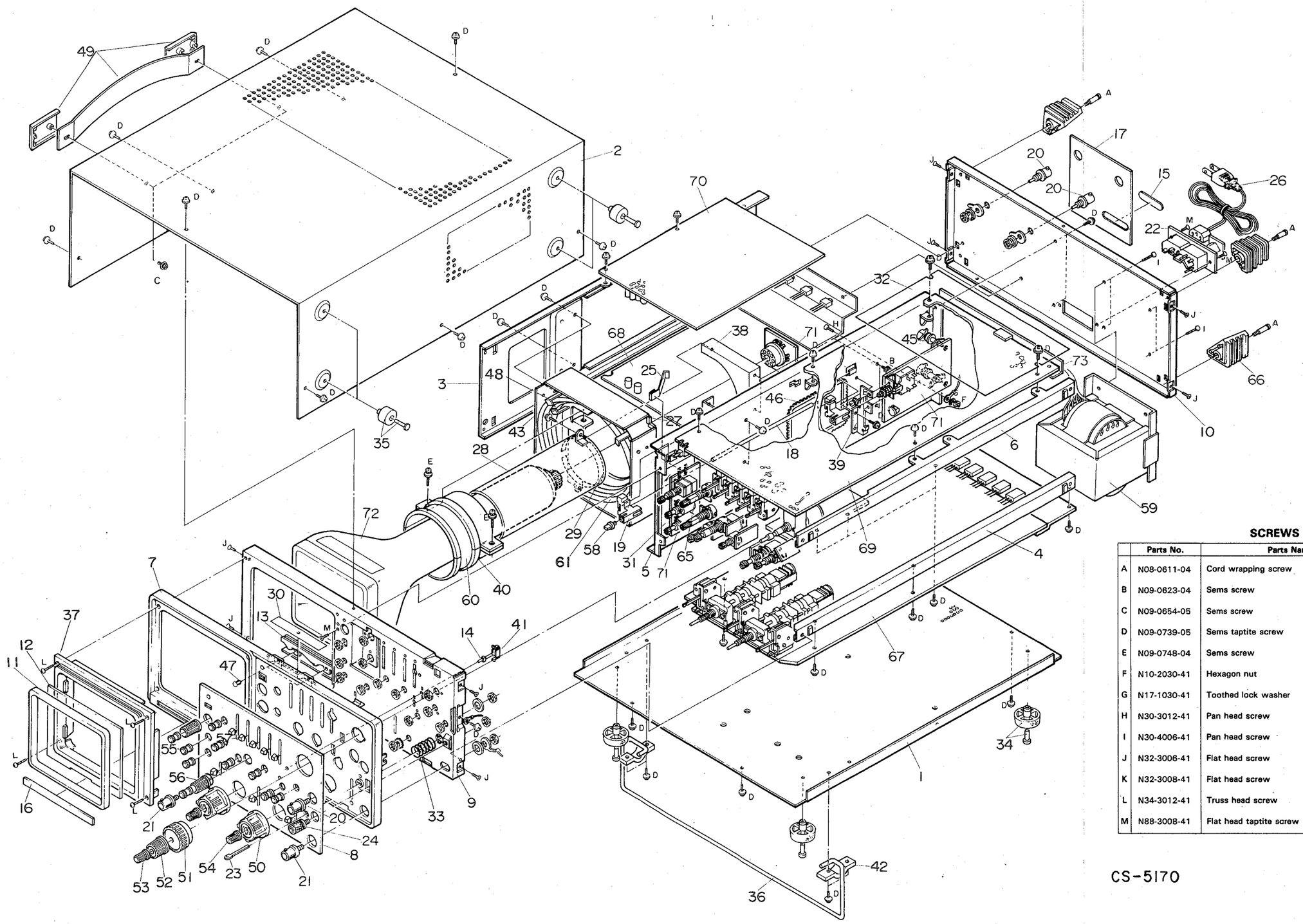
REF.NO	PARTS NO	NAME & DESCRIPTION			
	B30-0952-05	LAMP (T4.2 8V 0.15A)			
	B41-0710-04	CAUTION LABEL (HIGH VOLTAGE)			
	B50-7687-00	INSTRUCTION MANUAL,JAPANESE			
	B50-7688-00	INSTRUCTION MANUAL,ENGLISH			
	CC45CH1H470J	CAP. CERAMIC 47P 5% 50V			
	E23-0513-05	EARTH LUG,BNC			
	E31-0564-05	WIRE ASS'Y(GND GREEN)			
	E31-2861-05	WIRE ASS'Y (INLET-FILTER P69)			
	E31-5501-05	WIRE ASS'Y(CH1 BNC P18)			
	E31-5502-05	WIRE ASS'Y(CH1 OUT P1)			
	E31-5506-05	WIRE ASS'Y(CH2 BNC P19)			
	E31-5526-05	WIRE ASS'Y(Z AXIS P45)			
	E31-5537-05	WIRE ASS'Y(CURSOR VR P65)			
	E31-5644-05	WIRE ASS'Y(P30,50,52)			
	E31-5678-05	WIRE ASS'Y(EXT P23)			
	E31-5679-05	WIRE ASS'Y(CAL P9)			
	E31-5680-05	WIRE ASS'Y(P26)			
	E31-5681-05	WIRE ASS'Y(GND P63)			
	E31-5685-05	WIRE ASS'Y(P56)			
	E31-5686-05	WIRE ASS'Y(P60)			
	E31-5687-05	WIRE ASS'Y(P61)			
	E31-5688-05	WIRE ASS'Y			
	E31-5691-05	WIRE ASS'Y			
	E31-5696-05	WIRE ASS'Y(P4)			
	F01-0868-03	HEAT SINK			
	F05-1224-05	FUSE 1.2A(6X30MM) FOR 100/120V			
	F05-6313-05	FUSE(5X20MM) 0.63AT			
	F09-0510-04	EDGING			
	H01-5904-04	CARTON BOX			
	H10-2828-12	FOAMED STYRENE PAD (FRONT)			
	H10-2829-12	FOAMED STYRENE PAD (REAR)			
	H20-1727-04	VINYL COVER			
	H25-0029-04	POLYETHYLENE BAG (FUSE)			
	N19-0191-05	WASHER NONMETAL			
	RD14BB2C470J	RES. CARBON	47	5%	1/6W
	RD14BB2E101J	RES. CARBON	100	5%	1/4W
	W03-2301-15	R/D PROBE, PC-31			
	X81-2710-01	VR UNIT			
C1	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C2	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C3	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C4	CK45F1H103Z	CAP. CERAMIC	0.01		50V
Q302	2SB834(Y)	TR. SI. PNP			
Q305	2SA1668	TR. SI. PNP			
Q306	2SD880(Y)	TR. SI. NPN			
R1	RD14BB2E220J	RES. CARBON	22	5%	1/4W
R2	RD14BB2E220J	RES. CARBON	22	5%	1/4W
1	A01-1154-22	CASE(BOTTOM)			
2	A01-1193-02	CASE(TOP)			
3	A13-0914-02	FRAME (L)			
4	A13-0917-02	FRAME (R.LOWER)			
5	A13-0922-22	FRAME (CENTER)			
6	A13-0923-02	FRAME(R.UPPER)			
7	A20-2822-21	MOLDED PANEL			
8	A21-1152-03	DECORATIVE PANEL			
9	A22-0870-02	SUB PANEL			
10	A23-1682-02	REAR PANEL			
11	B07-0716-03	FILTER FRAME			
12	B19-0749-04	FILTER			
13	B30-0951-25	SCALE ILLUMI LAMP ASS'Y			
14	B30-0957-05	LED (LN322GPT)			
15	B40-2765-04	NAME PLATE (SERIAL NO)			
16	B40-2923-03	NAME PLATE (MODEL NO)			
17	B41-0808-04	CAUTION LABEL (MODEL)			
18	D21-0915-04	EXTENSION SHAFT			
19	D22-0501-04	JOINT & COUPLING			
20	E04-0259-05	BNC RECEPTACLE			
21	E04-0260-05	BNC RECEPTACLE (READOUT)			
22A	E18-0365-05	AC SELECTOR WITH 6X30MM FUSE			
22B	E18-0366-15	AC SELECTOR WITH 5X20MM FUSE			
23	E21-0660-04	TERMINAL,CAL			
24	E21-0667-05	METAL TERMINAL			
25	E23-0552-04	EARTH TERMINAL			
26A	E30-1818-05	JIS POWER CORD			
26B	E30-1819-05	CEE POWER CORD			
26C	E30-1820-05	UL/CSA POWER CORD			
26D	E30-1821-05	SAA POWER CORD			
26E	E30-1644-15	BS POWER CORD			

REF.NO	PARTS NO	NAME & DESCRIPTION
27	F09-0512-04	EDGING
28	F11-1206-03	CRT SHIELD
29	F15-0733-04	FELT (CRT SHIELD)
30	F20-0658-04	INSULATED SHEET
31	F20-0667-04	INSULATED SHEET
32	F20-0685-14	INSULATED SHEET
33	G01-0909-04	COIL SPRING (CAL SHIELD)
34	J02-0089-05	RUBBER FOOT
35	J02-0512-05	FOOT(SMALL)
36	J02-0515-04	TILT STAND
37	J10-0418-12	BEZEL
38	J19-1651-04	BLACKET
39	J19-1652-04	BLACKET FOR P.C.B.
40	J19-1653-23	HORDER FOR CRT
41	J19-1654-14	HOLDER FOR LED
42	J21-2573-04	HOLDER FOR LEG
43	J21-4594-23	BRACKET FOR CRT
45	J61-0516-05	SUPPORT
46	J42-0533-04	BUSHING (FREE)
47	J59-0403-05	NYLON RIVET (ILLUMI)
48	J61-0530-05	WIRE SADDLE
49	K01-0409-05	HANDLE
50	K21-0892-03	KNOB (VOLTS/DIV)
51	K21-0895-03	KNOB (A SWEEP)
52	K21-0896-03	KNOB (B SWEEP)
53	K21-0897-14	KNOB
54	K21-0899-04	KNOB
55	K23-0808-03	KNOB (10 USED)
56	K23-0809-03	KNOB
57	K27-0537-04	KNOB (FOR LEVER SWITCH)
58	K27-0538-04	KNOB (FOR PUSH SWITCH)
59	L01-9846-05	POWER TRANSFORMER
60	L39-0526-25	ROTATOR COIL
61	L76-0114-05	DELAY LINE
65	R29-1501-05	V.R. 1KB
66	W01-0503-04	REAR RUBBER FOOT/CORD WRAP
67	X73-1830-00	VERTICAL UNIT
68	X73-1840-00	FINAL UNIT
69	X74-1500-00	HORIZONTAL UNIT
70	X77-1510-01	R/D UNIT
71	X80-1060-04	LINE FILTER UNIT
72	150VTM31	CRT
73	A13-0942-13	FRAME

MODEL PC-31 (LOW CAPACITY PROBE)



ITEM	DESCRIPTION	PARTS NO.
①	Ground Wire Assembly	E30-1883-08
②	Retractable Hook Tip	E29-0540-08
③	Marker (Orange)	B42-1950-08



SCREWS

	Parts No.	Parts Name		Figure
A	N08-0611-04	Cord wrapping screw		
B	N09-0623-04	Sems screw	(M3×8)	
C	N09-0654-05	Sems screw	(M4×8)	
D	N09-0739-05	Sems taptite screw	(3×8)	
E	N09-0748-04	Sems screw	(M4×12)	
F	N10-2030-41	Hexagon nut		
G	N17-1030-41	Toothed lock washer		
H	N30-3012-41	Pan head screw	(M3×12)	
I	N30-4006-41	Pan head screw	(M4×6)	
J	N32-3006-41	Flat head screw	(M3×6)	
K	N32-3008-41	Flat head screw	(M3×8)	
L	N34-3012-41	Truss head screw	(M3×12)	
M	N88-3008-41	Flat head taptite screw	(3×8)	

CS-5170

PARTS LIST

VERTICAL UNIT

(X73-1830-00)

REF.NO	PARTS NO	NAME & DESCRIPTION			
	F01-0863-03	HEAT SINK	169X60XT1.6		
	F02-0519-04	HEAT SINK			
	F10-1590-14	SHIELD PLATE			
	F20-0647-05	INSULATOR			
	J25-5349-12	PCB (UNMOUNTED)			
	J61-0408-05	WIRE WRAPPING BAND			
	N09-0626-04	SCREW,SEMS	M3X10		
	N09-0742-04	SCREW,SEMS	M3X8		
	N19-0191-05	WASHER NONMETAL			
	R92-0150-05	JUMPING RES.	ZERO OHM(10MM)		
	R92-1061-05	JUMPING RES.	ZERO OHM (5MM)		
C001	C91-0501-05	CAP. METAL FILM	0.047	10%	630V
C004	C91-1270-05	CAP. POLYESTER	0.001	10%	400V
C005	CC45FCH1H200J	CAP. CERAMIC	20P	5%	50V
C006	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C007	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C008	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C009	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C010	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C011	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C012	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C013	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C014	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C015	CC45FCH1H100D	CAP. CERAMIC	10P	0.5P	50V
C016	CC45FCH1H150J	CAP. CERAMIC	15P	5%	50V
C017	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C018	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C019	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C020	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C021	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C022	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C023	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C024	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C025	CC45FCH1H330J	CAP. CERAMIC	33P	5%	50V
C026	CC45FCH1H330J	CAP. CERAMIC	33P	5%	50V
C027	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C028	CC45FCH1H010C	CAP. CERAMIC	1P	0.25P	50V
C029	CC45FCH1H820J	CAP. CERAMIC	82P	5%	50V
C032	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C033	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C034	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C035	CC45FCH1H151J	CAP. CERAMIC	150P	5%	50V
C036	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C037	CE04EW1E330M	CAP. ELECTRO	33	20%	25V
C038	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C039	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C040	NO USE				
C041	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C042	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C043	NO USE				
C044	CC45FCH1H270J	CAP. CERAMIC	27P	5%	50V
C045	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C046	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C047	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C101	C91-0501-05	CAP. METAL FILM	0.047	10%	630V
C104	C91-1270-05	CAP. POLYESTER	0.001	10%	400V
C105	CC45FCH1H200J	CAP. CERAMIC	20P	5%	50V
C106	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C107	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C108	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C109	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C110	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C111	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C112	NO USE				
C113	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C114	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C115	CC45FCH1H100D	CAP. CERAMIC	10P	0.5P	50V
C116	CC45FCH1H150J	CAP. CERAMIC	15P	5%	50V
C117	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C118	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C119	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C120	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C121	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C122	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C123	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C124	CK45FF1H103Z	CAP. CERAMIC	0.01		50V

REF.NO	PARTS NO	NAME & DESCRIPTION			
C125	CC45FCH1H330J	CAP. CERAMIC	33P	5%	50V
C126	CC45FCH1H330J	CAP. CERAMIC	33P	5%	50V
C127	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C128	CC45FCH1H010C	CAP. CERAMIC	1P	0.25P	50V
C129	CC45FCH1H820J	CAP. CERAMIC	82P	5%	50V
C132	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C133	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C134	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C135	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C136	CC45FCH1H680J	CAP. CERAMIC	68P	5%	50V
C137	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C138	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C139	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C140	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C141	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C201	CC45FCH1H090D	CAP. CERAMIC	9P	0.5P	50V
C202	CC45FCH1H090D	CAP. CERAMIC	9P	0.5P	50V
C203	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C204	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C205	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C206	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C207	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C208	CC45SL1H681J	CAP. CERAMIC	680P	5%	50V
C209	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C210	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C211	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C212	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C213	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C214	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C215	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C216	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C217	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C218	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C219	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C220	NO USE				
C221	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C222	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C223	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C301	CE04EW1V222M	CAP. ELECTRO	2200	20%	35V
C302	CE04EW1E332M	CAP. ELECTRO	3300	20%	25V
C303	NO USE				
C304	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C305	CE04W2E470M	CAP. ELECTRO	47	20%	250V
C306	CE04W2C010M	CAP. ELECTRO	1	20%	160V
C307	CE04W2C010M	CAP. ELECTRO	1	20%	160V
C308	CE04W2C101M	CAP. ELECTRO	100	20%	160V
C309	CQ92FM1H223K	CAP. MYLAR	0.022	10%	50V
C310	NO USE				
C311	CE04EW2A010M				
C312	CE04EW1C222M	CAP. ELECTRO	2200	20%	16V
C313	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C314	CE04EW1V221M	CAP. ELECTRO	220	20%	35V
C315	CE04EW1E470M	CAP. ELECTRO	47	20%	25V
C316	CQ92FM1H223K	CAP. MYLAR	0.022	10%	50V
C317	CE04EW2A010M				
C318	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C319	CE04EW1E470M	CAP. ELECTRO	47	20%	25V
C320	CE04EW1E470M	CAP. ELECTRO	47	20%	25V
C321	CE04EW1E470M	CAP. ELECTRO	47	20%	25V
C322	CE04EW1E470M	CAP. ELECTRO	47	20%	25V
C323	CE04EW1E470M	CAP. ELECTRO	47	20%	25V
C351	CQ92FM1H103J	CAP. MYLAR	0.01	5%	50V
C352	CQ92FM1H103J	CAP. MYLAR	0.01	5%	50V
C353	NO USE				
C354	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C355	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C401	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C402	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C403	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C404	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C405	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C406	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C407	NO USE				
C408	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C409	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C410	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C411	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C412	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C413	CK45FF1H103Z	CAP. CERAMIC	0.01		50V

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
C414	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C415	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C416	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C417	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C418	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C419	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C801	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C802	CE04EW2A100M	CAP. ELECTRO	10	20%	100V
C803	CE04EW1E470M	CAP. ELECTRO	47	20%	25V
C804	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C805	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C901	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C902	CC45SL1H221J	CAP. CERAMIC	220P	5%	50V
D001	HZS6.8J(B2)	DIODE, ZENER	6.79V		
D002	1SS132	DIODE			
D003	1SS132	DIODE			
D004	1SS132	DIODE			
D005	1SS132	DIODE			
D006	1SS86	DIODE			
D007	1SS132	DIODE			
D008	1SS132	DIODE			
D101	HZS6.8J(B2)	DIODE, ZENER	6.79V		
D102	1SS132	DIODE			
D103	1SS132	DIODE			
D104	1SS132	DIODE			
D105	1SS132	DIODE			
D106	1SS86	DIODE			
D107	1SS132	DIODE			
D201	1SS132	DIODE			
D202	1SS132	DIODE			
D203	1SS132	DIODE			
D204	1SS132	DIODE			
D301	S4VB40F1	DIODE, BRIDGE			
D302	HZS13J(B2)	DIODE, ZENER	13.21V		
D303	1SS132	DIODE			
D304	1SS132	DIODE			
D305	HZS13J(B2)	DIODE, ZENER	13.21V		
D306	1SS132	DIODE			
D307	HZS5.6J(B2)	DIODE, ZENER	5.62V		
D308	S2VB40F1	DIODE, BRIDGE			
D309	1SS132	DIODE			
D310	S2VB40F1	DIODE, BRIDGE			
D311	1SS132	DIODE			
D312	S4VB40F1	DIODE, BRIDGE			
D313	V06B	DIODE			
D801	1SS132	DIODE			
D802	1SS132	DIODE			
D803	1SS132	DIODE			
D804	1SS132	DIODE			
J055	E31-5645-05	LEAD WIRE WITH CONNECTOR			
J058	E31-5647-05	LEAD WIRE WITH CONNECTOR			
J059	E31-5648-05	LEAD WIRE WITH CONNECTOR			
J071	E31-5697-05				
JW003	E31-5649-05	LEAD WIRE WITH CONNECTOR			
JW004	E31-5650-05	LEAD WIRE WITH CONNECTOR			
JW010	E31-5651-05	LEAD WIRE WITH CONNECTOR			
JW011	NO USE				
JW012	E31-5651-05	LEAD WIRE WITH CONNECTOR			
JW027	E31-5670-05	LEAD WIRE WITH CONNECTOR			
JW801	E31-5690-05	LEAD WIRE WITH CONNECTOR			
L001	L40-1092-13	FERRI INDUCTOR	1UH	20%	
P001	E40-0273-05	PIN CONNECTOR	2P		
P002	E40-0373-05	PIN CONNECTOR	3P		
P003	E40-0773-05	PIN CONNECTOR	7P		
P004	E40-0273-05	PIN CONNECTOR	2P		
P005	E40-0273-05	PIN CONNECTOR	2P		
P006	E40-0373-05	PIN CONNECTOR	3P		
P007	E40-0773-05	PIN CONNECTOR	7P		
P008	NO USE				

REF.NO	PARTS NO	NAME & DESCRIPTION			
P009	E40-0273-05	PIN CONNECTOR	2P		
P010	NO USE				
P011	E40-7060-05	PIN CONNECTOR	6P		
P012	NO USE				
P013	E40-0773-05	PIN CONNECTOR	7P		
P014	E40-0673-05	PIN CONNECTOR	6P		
P015	E40-0473-05	PIN CONNECTOR	4P		
P016	E40-0673-05	PIN CONNECTOR	6P		
P017	E40-0773-05	PIN CONNECTOR	7P		
P018	E40-0273-05	PIN CONNECTOR	2P		
P019	E40-0273-05	PIN CONNECTOR	2P		
P020	E40-7059-05	PIN CONNECTOR	4P		
P021	E40-0273-05	PIN CONNECTOR	2P		
P056	E40-0373-05	PIN CONNECTOR	3P		
P057	E40-0473-05	PIN CONNECTOR	4P		
P060	E40-0373-05	PIN CONNECTOR	3P		
P061	E40-0373-05	PIN CONNECTOR	3P		
Q001	2SC1907	TR. SI, NPN			
Q002	2SK304(E)	FET, N-CHANNEL			
Q003	2SC1907	TR. SI, NPN			
Q004	2SA1206(K)	TR. SI, PNP			
Q005	2SC1907	TR. SI, NPN			
Q006	2SC2570A				
Q007	2SC2570A				
Q008	2SA1161	TR. SI, PNP			
Q009	2SA1161	TR. SI, PNP			
Q010	2SA1206(K)	TR. SI, PNP			
Q011	2SA1206(K)	TR. SI, PNP			
Q012	2SA1005(K)	TR. SI, PNP			
Q013	2SA1005(K)	TR. SI, PNP			
Q014	2SA1206(K)	TR. SI, PNP			
Q015	2SC2570A	TR. SI, NPN			
Q016	2SC945(Q)	TR. SI, NPN			
Q101	2SC1907	TR. SI, NPN			
Q102	2SK304(E)	FET, N-CHANNEL			
Q103	2SC1907	TR. SI, NPN			
Q104	2SA1206(K)	TR. SI, PNP			
Q105	2SC1907	TR. SI, NPN			
Q106	2SC2570A				
Q107	2SC2570A				
Q108	2SA1161	TR. SI, PNP			
Q109	2SA1161	TR. SI, PNP			
Q110	2SA1206(K)	TR. SI, PNP			
Q111	2SA1206(K)	TR. SI, PNP			
Q112	2SA1206(K)	TR. SI, PNP			
Q113	2SA1206(K)	TR. SI, PNP			
Q114	2SA1005(K)	TR. SI, PNP			
Q115	2SA1005(K)	TR. SI, PNP			
Q116	2SA1206(K)	TR. SI, PNP			
Q201	2SA1206(K)	TR. SI, PNP			
Q202	2SA1206(K)	TR. SI, PNP			
Q203	2SC945(Q)	TR. SI, NPN			
Q204	2SA844(D)	TR. SI, PNP			
Q301	2SD880(Y)	TR. SI, NPN			
Q302	NO USE				
Q303	2SD880(Y)	TR. SI, NPN			
Q304	2SA1668	TR. SI, PNP			
Q412	2SD1666	TR. SI, NPN			
R001	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R002	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R013	RN14BK2E1004F	RES. METAL FILM	1M	1%	1/4W
R014	RD14BB2E824J	RES. CARBON	820K	5%	1/4W
R015	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R016	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R017	RD14BB2E274J	RES. CARBON	270K	5%	1/4W
R018	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R019	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R020	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R021	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R022	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R023	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R024	RD14BB2E100J	RES. CARBON	10	5%	1/4W
R025	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R026	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R027	RD14BB2E100J	RES. CARBON	10	5%	1/4W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R035	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R036	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R037	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R038	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R039	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R040	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R041	RD14BB2C224J	RES. CARBON	220K	5%	1/6W
R042	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R043	RN14BK2E3300F	RES. METAL FILM	330	1%	1/4W
R044	RN14BK2E1200F	RES. METAL FILM	120	1%	1/4W
R045	RN14BK2E1200F	RES. METAL FILM	120	1%	1/4W
R046	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R047	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R048	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R049	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R050	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R051	RN14BK2C33R0F	RES. METAL FILM	33.0	1%	1/6W
R052	RN14BK2C33R0F	RES. METAL FILM	33.0	1%	1/6W
R053	RD14BB2C560J	RES. CARBON	56	5%	1/6W
R054	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R055	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R056	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R057	RN14BK2C33R0F	RES. METAL FILM	33.0	1%	1/6W
R058	RN14BK2C33R0F	RES. METAL FILM	33.0	1%	1/6W
R059	RN14BK2C1800F	RES. METAL FILM	180	1%	1/6W
R060	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R061	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R062	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R063	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R064	RN14BK2C1200F	RES. METAL FILM	120	1%	1/6W
R065	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R066	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R067	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R068	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R069	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R070	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R071	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R072	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R073	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R074	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R075	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R076	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R077	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R078	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R079	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R080	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R081	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R082	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R083	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R084	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R085	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R086	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R087	RD14BB2E102J	RES. CARBON	1K	5%	1/4W
R088	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R089	RD14BB2C112J	RES. CARBON	1.1K	5%	1/6W
R090	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R091	RD14BB2C360J	RES. CARBON	36	5%	1/6W
R092	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R093	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R094	RD14BB2E562J	RES. CARBON	5.6K	5%	1/4W
R101	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R102	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R113	RN14BK2E1004F	RES. METAL FILM	1M	1%	1/4W
R114	RD14BB2E824J	RES. CARBON	820K	5%	1/4W
R115	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R116	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R117	RD14BB2C274J	RES. CARBON	270K	5%	1/6W
R118	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R119	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R120	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R121	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R122	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R123	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R124	RD14BB2E100J	RES. CARBON	10	5%	1/4W
R125	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R126	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R127	RD14BB2E100J	RES. CARBON	10	5%	1/4W
R135	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R136	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R137	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R138	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W

REF.NO	PARTS NO	NAME & DESCRIPTION			
R139	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R140	RN14BK2E3300F	RES. METAL FILM	330	1%	1/4W
R141	RD14BB2C224J	RES. CARBON	220K	5%	1/6W
R142	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R143	RN14BK2E3300F	RES. METAL FILM	330	1%	1/4W
R144	RN14BK2E1200F	RES. METAL FILM	120	1%	1/4W
R145	RN14BK2E1200F	RES. METAL FILM	120	1%	1/4W
R146	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R147	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R148	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R149	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R150	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R151	RN14BK2C33R0F	RES. METAL FILM	33.0	1%	1/6W
R152	RN14BK2C33R0F	RES. METAL FILM	33.0	1%	1/6W
R153	RD14BB2C560J	RES. CARBON	56	5%	1/6W
R154	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R155	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R156	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R157	RN14BK2C33R0F	RES. METAL FILM	33.0	1%	1/6W
R158	RN14BK2C33R0F	RES. METAL FILM	33.0	1%	1/6W
R159	RN14BK2C1800F	RES. METAL FILM	180	1%	1/6W
R160	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R161	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R162	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R163	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R164	RN14BK2C1200F	RES. METAL FILM	120	1%	1/6W
R165	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R166	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R167	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R168	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R169	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R170	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R171	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R172	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R173	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R174	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R175	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R176	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R177	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R178	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R179	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R180	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R181	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R182	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R183	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R184	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R185	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R186	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R187	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R188	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R189	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R190	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R201	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R202	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R203	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R204	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R207	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R208	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R209	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R210	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R211	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R212	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R213	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R214	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R215	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R216	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R217	RD14BB2E103J	RES. CARBON	10K	5%	1/4W
R218	RD14BB2E103J	RES. CARBON	10K	5%	1/4W
R219	RD14BB2E103J	RES. CARBON	10K	5%	1/4W
R220	R90-0645-05	RES. NETWORK	4X10K	5%	
R221	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R222	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R223	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R224	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R225	RD14BB2E101J	RES. CARBON	100	5%	1/4W
R226	RD14BB2E101J	RES. CARBON	100	5%	1/4W
R227	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R228	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R229	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R230	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R231	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R232	RD14BB2E100J	RES. CARBON	10	5%	1/4W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R301	RS14GB3D2R2J	RES. METAL FILM	2.2	5%	2W
R302	RD14BB2E101J	RES. CARBON	100	5%	1/4W
R303	RS14GB3D470J	RES. METAL FILM	47	5%	2W
R304	RN14BK2C1202F	RES. METAL FILM	12K	1%	1/6W
R305	RN14BK2C1202F	RES. METAL FILM	12K	1%	1/6W
R306	RS14GB3D010J	RES. METAL FILM	1	5%	2W
R307	RS14GB3F270J	RES. METAL FILM	27	5%	3W
R308	RN14BK2C5601F	RES. METAL FILM	5.6K	1%	1/6W
R309	RN14BK2C5601F	RES. METAL FILM	5.6K	1%	1/6W
R310	RN14BK2C5601F	RES. METAL FILM	5.6K	1%	1/6W
R311	RS14GB3D220J	RES. METAL FILM	22	5%	2W
R312	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
R313	RN14BK2C9101F	RES. METAL FILM	9.1K	1%	1/6W
R314	RS14GB3A270J	RES. METAL FILM	27	5%	1W
R315	RS14GB3D272J	RES. METAL FILM	2.7K	5%	2W
R316	NO USE				
R317	RD14BB2E4R7J	RES. CARBON	4.7	5%	1/4W
R318	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R319	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R320	RN14BK2C1153F	RES. METAL FILM	115K	1%	1/6W
R321	RN14BK2E1002F	RES. METAL FILM	10K	1%	1/4W
R322	RS14GB3A270J	RES. METAL FILM	27	5%	1W
R323	RS14GB3A472J	RES. METAL FILM	4.7K	5%	1W
R324	RD14BB2C4R7J	RES. CARBON	4.7	5%	1/6W
R325	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R326	RD14BB2E221J	RES. CARBON	220	5%	1/4W
R327	RN14BK2C5602F	RES. METAL FILM	56K	1%	1/6W
R328	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R334	RN14BK2C1152F				
R335	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R336	RS14GB3D010J	RES. METAL FILM	1	5%	2W
R337	RS14GB3D330J	RES. METAL FILM	33	5%	2W
R338	RN14BK2C3741F	RES. METAL FILM	3.74K	1%	1/6W
R339	RN14BK2E9101F	RES. METAL FILM	9.1K	1%	1/4W
R340	RD14BB2E225J	RES. CARBON	2.2M	5%	1/4W
R341	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R351	RD14BB2C184J	RES. CARBON	180K	5%	1/6W
R352	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R353	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R354	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R355	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R356	RD14BB2C224J	RES. CARBON	220K	5%	1/6W
R357	RD14BB2C474J	RES. CARBON	470K	5%	1/6W
R358	RD14BB2C474J	RES. CARBON	470K	5%	1/6W
R359	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R360	RN14BK2C1102F	RES. METAL FILM	11K	1%	1/6W
R361	RN14BK2C750OF	RES. METAL FILM	750	1%	1/6W
R362	NO USE				
R363	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R401	R90-0642-05	RES. NETWORK	6X100K		
R402	R90-0643-05	RES. NETWORK	7X100K		
R403	R90-0667-05	RES. NETWORK	4X4.7K		
R801	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R802	RD14BB2C390J	RES. CARBON	39	5%	1/6W
R803	RD14BB2E331J	RES. CARBON	330	5%	1/4W
R804	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R805	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R806	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R807	RD14BB2E910J	RES. CARBON	91	5%	1/4W
R808	RD14BB2E910J	RES. CARBON	91	5%	1/4W
R901	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
S001	S32-4007-05	LEVER SWITCH 4-3			
S002	S02-4513-05				
S101	S32-4007-05	LEVER SWITCH 4-3			
S102	S02-4513-05				
S201	S32-4008-05	LEVER SWITCH 4-5			
TC005	C05-0453-05	CAP. TRIMMER	10P		
TC006	C05-0453-05	CAP. TRIMMER	10P		
TC007	C05-0456-05	CAP. TRIMMER	60PF		
TC008	C05-0456-05	CAP. TRIMMER	60PF		
TC105	C05-0453-05	CAP. TRIMMER	10P		
TC106	C05-0453-05	CAP. TRIMMER	10P		
TC107	C05-0456-05	CAP. TRIMMER	60PF		
TC108	C05-0456-05	CAP. TRIMMER	60PF		

REF.NO	PARTS NO	NAME & DESCRIPTION
TH001	SDT100	THERMISTOR
TH002	111-400-3	THERMISTER
TH101	SDT100	THERMISTOR
TH102	111-400-3	THERMISTER
U001	LF411CN	IC,DUAL JFET INPUT OP AMP
U002	CA3127E	IC. TR. ARRY N-P-N
U101	LF411CN	IC,DUAL JFET INPUT OP AMP
U102	CA3127E	IC. TR. ARRY N-P-N
U201	SN74LS47N	IC, DECODER/DRIVER
U202	SN74LS00N	IC, QUAD 2-INPUT NAND GATE
U203	SN74LS00N	IC, QUAD 2-INPUT NAND GATE
U204	SN74LS112AN	IC, DUAL JK-FF
U205	SN74LS00N	IC, QUAD 2-INPUT NAND GATE
U301	NJM4558D	IC, DUAL OP AMP
U302	NJM4558D	IC, DUAL OP AMP
U303	NJM4558D	IC, DUAL OP AMP
U304	78020AP	
U351	TC4011BP	IC, QUAD 2-INPUT NAND GATE
VR001	R12-4516-05	RES. SEMI FIXED 50K B
VR002	R12-3550-05	RES. SEMI FIXED 20K B
VR003	R12-0577-05	RES. SEMI FIXED 500 B
VR004	R12-0575-05	RES. SEMI FIXED 100 B
VR005	R12-1546-05	RES. SEMI FIXED 2K B
VR006	NO USE	
VR007	R12-3550-05	RES. SEMI FIXED 20K B
VR008	R12-0576-05	RES. SEMI FIXED 200 B
VR009	R12-0577-05	RES. SEMI FIXED 500 B
VR010	R12-1545-05	RES. SEMI FIXED 1K B
VR011	R12-1545-05	RES. SEMI FIXED 1K B
VR101	R12-4516-05	RES. SEMI FIXED 50K B
VR102	R12-3550-05	RES. SEMI FIXED 20K B
VR103	R12-0577-05	RES. SEMI FIXED 500 B
VR104	R12-0575-05	RES. SEMI FIXED 100 B
VR105	R12-1546-05	RES. SEMI FIXED 2K B
VR106	NO USE	
VR107	R12-3550-05	RES. SEMI FIXED 20K B
VR108	R12-0576-05	RES. SEMI FIXED 200 B
VR109	R12-0577-05	RES. SEMI FIXED 500 B
VR110	R12-1545-05	RES. SEMI FIXED 1K B
VR111	R12-1545-05	RES. SEMI FIXED 1K B
VR201	R12-0575-05	RES. SEMI FIXED 100 B
VR301	R12-1545-05	RES. SEMI FIXED 1K B
VR351	R12-0577-05	RES. SEMI FIXED 500 B

PARTS LIST

VERTICAL FINAL UNIT

(X73-1840-00)

REF.NO	PARTS NO	NAME & DESCRIPTION			
	F02-0511-05	HEAT SINK(Q13,14)			
	J25-5347-13	PCB (UNMOUNTED)			
	J30-0605-05	SPACER			
	L92-0110-05	FERRITE BEADS			
	R92-1061-05	JUMPING RES.	ZERO OHM (5MM)		
C002	CC45CH1H271J	CAP. CERAMIC	270P	5%	50V
C003	CK45FB1H222K	CAP. CERAMIC	2200P	10%	50V
C004	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C005	C91-1275-05	CAP. ELECTRO	0.033F	5.5V	
C006	C91-1275-05	CAP. ELECTRO	0.033F	5.5V	
C007	NO USE				
C008	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C009	NO USE				
C010	CE04HW1C100M	CAP. ELECTRO	10	20%	16V
C011	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C012	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C013	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C014	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C015	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C016	C91-0753-05	CAP. CERAMIC	470P	10%	50V
C017	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C018	CQ92FM1H473K	CAP. MYLAR	0.047	10%	50V
C019	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C020	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C021	CK45B2H103K	CAP. CERAMIC	0.01	10%	500V
C022	CK45B2H103K	CAP. CERAMIC	0.01	10%	500V
C023	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C024	CE04EW1E470M	CAP. ELECTRO	47	20%	25V
C025	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C026	CE04EW1E470M	CAP. ELECTRO	47	20%	25V
C027	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C028	CE04EW1E470M	CAP. ELECTRO	47	20%	25V
C029	CK45B2H103K	CAP. CERAMIC	0.01	10%	500V
C030	CK45B2H103K	CAP. CERAMIC	0.01	10%	500V
C031	CK45B2H103K	CAP. CERAMIC	0.01	10%	500V
C032	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C033	CE04EW1E470M	CAP. ELECTRO	47	20%	25V
C034	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C035	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C036	CE04W2C010M	CAP. ELECTRO	1	20%	160V
C101	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C102	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C103	NO USE				
C104	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C201	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C202	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C203	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C204	NO USE				
C205	CC45FCH1H680J	CAP. CERAMIC	68P	5%	50V
C206	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C207	CC45FCH1H330J	CAP. CERAMIC	33P	5%	50V
C208	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C209	CC45FCH1H330J	CAP. CERAMIC	33P	5%	50V
C210	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C211	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C212	CK45B2H103K	CAP. CERAMIC	0.01	10%	500V
C213	CK45B2H103K	CAP. CERAMIC	0.01	10%	500V
C214	C91-1269-05	CAP. POLYESTER	0.047	10%	250V
C215	C91-1269-05	CAP. POLYESTER	0.047	10%	250V
C216	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C217	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C218	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C219	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C801	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
D001	MA700	DIODE			
D002	MA700	DIODE			
D101	MA700	DIODE			
D102	MA700	DIODE			
D103	1SS132	DIODE			
D104	1SS132	DIODE			
D105	MA700	DIODE			
D106	NO USE				
D107	1SS132	DIODE			
D108	MA700	DIODE			
D109	NO USE				
D110	1SS132	DIODE			
D201	1SS132	DIODE			
D202	MA700	DIODE			
D203	MA700	DIODE			
L001	L40-4701-03	FERRI INDUCTOR	47UH	10%	
L002	L40-4701-03	FERRI INDUCTOR	47UH	10%	
L003	L40-4701-03	FERRI INDUCTOR	47UH	10%	
L004	L40-4701-03	FERRI INDUCTOR	47UH	10%	
L005	L40-4701-03	FERRI INDUCTOR	47UH	10%	
L006	L40-4701-03	FERRI INDUCTOR	47UH	10%	
L007	L40-3381-70	FERRI INDUCTOR	0.33UH	10%	
L008	L40-3381-70	FERRI INDUCTOR	0.33UH	10%	
P006	E40-0373-05	PIN CONNECTOR	3P		
P007	NO USE				
P008	E40-0373-05	PIN CONNECTOR	3P		
P013	E40-0773-05	PIN CONNECTOR	7P		
P029	E40-0873-05	PIN CONNECTOR	8P		
P034	E23-0401-05	PIN TERMINAL			
P035	E40-0373-05	PIN CONNECTOR	3P		
P036	E40-0373-05	PIN CONNECTOR	3P		
P048	E40-0473-05	PIN CONNECTOR	4P		
P062	E40-0373-05	PIN CONNECTOR	3P		
Q001	2SC2671(H)	TR. SI, NPN			
Q002	2SC2671(H)	TR. SI, NPN			
Q003	2SA1206(K)	TR. SI, PNP			
Q004	2SA1206(K)	TR. SI, PNP			
Q005	2SC2671(H)	TR. SI, NPN			
Q006	2SC2671(H)	TR. SI, NPN			
Q007	2SC2785(F)	TR. SI, NPN			
Q008	2SA1206(K)	TR. SI, PNP			
Q009	2SA1206(K)	TR. SI, PNP			
Q012	2SC2671(H)	TR. SI, NPN			
Q013	2SC2671(H)	TR. SI, NPN			
Q014	2SC3779(D)	TR. SI, NPN			
Q015	2SC3779(D)	TR. SI, NPN			
Q016	2SC3779(D)	TR. SI, NPN			
Q017	2SC3779(D)	TR. SI, NPN			
Q018	2SC1164(O)	TR. SI, NPN			
Q019	2SC1164(O)	TR. SI, NPN			
Q101	2SC1907	TR. SI, NPN			
Q102	2SC1907	TR. SI, NPN			
Q103	2SA1005(K)	TR. SI, PNP			
Q104	2SA1005(K)	TR. SI, PNP			
Q105	2SC1907	TR. SI, NPN			
Q106	2SC1907	TR. SI, NPN			
Q107	2SA1005(K)	TR. SI, PNP			
Q108	2SA1005(K)	TR. SI, PNP			
Q201	2SC1907	TR. SI, NPN			
Q202	2SC1907	TR. SI, NPN			
Q203	2SA1015(Y)	TR. SI, PNP			
Q204	2SA1015(Y)	TR. SI, PNP			
Q205	2SC1907	TR. SI, NPN			
Q206	2SC1907	TR. SI, NPN			
Q207	2SA1005(K)	TR. SI, PNP			
Q208	2SA1005(K)	TR. SI, PNP			
Q209	2SC1907	TR. SI, NPN			
Q210	2SC1907	TR. SI, NPN			
Q211	2SC3423	TR. SI, NPN			
Q212	2SC3423	TR. SI, NPN			
Q213	2SA1360(Y)	TR. SI, PNP			
Q214	2SA1360(Y)	TR. SI, PNP			
R001	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
R002	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
R003	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R004	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R005	RN14BK2C82R0F	RES. METAL FILM	82.0	1%	1/6W
R006	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R007	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R008	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R009	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R010	RD14BB2C203J	RES. CARBON	20K	5%	1/6W
R011	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R012	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R013	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R014	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R017	RN14BK2C2701F	RES. METAL FILM	2.7K	1%	1/6W
R018	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
R019	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R020	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R021	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R022	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R023	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R024	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R025	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R026	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R027	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R028	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R029	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R030	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R031	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R032	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R033	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R034	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R037	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
R042	RN14BK2E3900F	RES. METAL FILM	390	1%	1/4W
R043	RN14BK2E3900F	RES. METAL FILM	390	1%	1/4W
R044	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R045	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R046	RD14BB2E361J	RES. CARBON	360	5%	1/4W
R047	RD14BB2E361J	RES. CARBON	360	5%	1/4W
R048	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R049	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R050	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R051	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R052	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R053	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R054	RN14BK2E33R0F	RES. METAL FILM	33.0	1%	1/4W
R055	RN14BK2E33R0F	RES. METAL FILM	33.0	1%	1/4W
R056	RD14BB2E100J	RES. CARBON	10	5%	1/4W
R057	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R058	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R059	RD14BB2C752J	RES. CARBON	7.5K	5%	1/6W
R060	RD14BB2E220J	RES. CARBON	22	5%	1/4W
R061	RD14BB2E220J	RES. CARBON	22	5%	1/4W
R062	RS14GB3F911J	RES. METAL FILM	910	5%	3W
R063	RS14GB3F102J	RES. METAL FILM	1K	5%	3W
R064	RS14GB3F911J	RES. METAL FILM	910	5%	3W
R065	RS14GB3F102J	RES. METAL FILM	1K	5%	3W
R066	RD14BB2E391J	RES. CARBON	390	5%	1/4W
R067	RD14BB2E391J	RES. CARBON	390	5%	1/4W
R068	RD14BB2C271J	RES. CARBON	270	5%	1/6W
R069	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R070	RD14BB2C163J	RES. CARBON	16K	5%	1/6W
R101	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R102	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R103	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R104	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R105	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R106	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R107	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R108	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R109	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R110	RN14BK2C8201F	RES. METAL FILM	8.2K	1%	1/6W
R111	RN14BK2E1601F	RES. METAL FILM	1.6K	1%	1/4W
R112	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R113	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R114	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R115	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R116	NO USE				
R117	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R118	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R119	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R120	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R121	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R122	RN14BK2C1201F	RES. METAL FILM	1.2K	1%	1/6W
R123	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R124	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R125	RD14BB2C103J	RES. CARBON	10K	5%	1/6W

REF.NO	PARTS NO	NAME & DESCRIPTION			
R126	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R127	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R128	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R129	RN14BK2C8201F	RES. METAL FILM	8.2K	1%	1/6W
R130	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
R131	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R132	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R133	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R134	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R135	RD14BB2E103J	RES. CARBON	10K	5%	1/4W
R201	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R202	RN14BK2C3741F	RES. METAL FILM	3.74K	1%	1/6W
R203	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R204	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R205	RD14BB2E682J	RES. CARBON	6.8K	5%	1/4W
R206	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R207	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R208	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R209	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R210	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R211	RN14BK2E47R0F	RES. METAL FILM	47.0	1%	1/4W
R212	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R213	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R214	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R215	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R216	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R217	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R218	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R219	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R220	RD14BB2E822J	RES. CARBON	8.2K	5%	1/4W
R221	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R222	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R223	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R224	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R225	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R226	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R227	RD14BB2C124J	RES. CARBON	120K	5%	1/6W
R228	RD14BB2C124J	RES. CARBON	120K	5%	1/6W
R229	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R230	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R231	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R232	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R233	NO USE				
R234	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R235	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R236	RD14BY2H473J	RES. CARBON	47K	5%	1/2W
R237	RD14BY2H473J	RES. CARBON	47K	5%	1/2W
R238	RD14BY2H683J	RES. CARBON	68K	5%	1/2W
R239	RD14BY2H683J	RES. CARBON	68K	5%	1/2W
R240	NO USE				
R241	RN14BK2C1201F	RES. METAL FILM	1.2K	1%	1/6W
R242	RN14BK2C1201F	RES. METAL FILM	1.2K	1%	1/6W
R801	RD14BB2C124J	RES. CARBON	120K	5%	1/6W
R902	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R903	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R904	RD14BB2E154J	RES. CARBON	150K	5%	1/4W
R905	RD14BB2E471J	RES. CARBON	470	5%	1/4W
R906	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
TC001	C05-0454-05	CAP. TRIMMER	20PF		
TC002	C05-0454-05	CAP. TRIMMER	20PF		
TC003	C05-0455-05	CAP. TRIMMER	30PF		
TC004	C05-0453-05	CAP. TRIMMER	10P		
TH901	SDT1000	THERMISTOR			
VR001	R12-1545-05	RES. SEMI FIXED	1K B		
VR002	R12-0576-05	RES. SEMI FIXED	200 B		
VR003	R12-3550-05	RES. SEMI FIXED	20K B		
VR004	R12-1546-05	RES. SEMI FIXED	2K B		
VR005	R12-0577-05	RES. SEMI FIXED	500 B		
VR006	R12-0575-05	RES. SEMI FIXED	100 B		
VR101	R12-0576-05	RES. SEMI FIXED	200 B		
VR102	R12-1545-05	RES. SEMI FIXED	1K B		
VR103	R12-0577-05	RES. SEMI FIXED	500 B		
VR104	R12-1545-05	RES. SEMI FIXED	1K B		
VR201	R12-1545-05	RES. SEMI FIXED	1K B		
VR202	R12-0575-05	RES. SEMI FIXED	100 B		
VR203	R12-7508-05	RES. SEMI FIXED	500K B		

PARTS LIST

HORIZONTAL UNIT

(X74-1500-00)

REF.NO	PARTS NO	NAME & DESCRIPTION			
	E31-5533-15	LEAD WIRE WITH CONNECTOR,P39			
	F01-0867-05	HEAT SINK			
	F11-1208-03	SHIELD CASE			
	F15-0727-04	HOLDER (NEON LAMP)			
	J25-5268-04	PCB (UNMOUNTED) 86X46			
	J25-5348-12	PCB (UNMOUNTED)			
	J42-0538-04	BUSHING			
	L92-0110-05	FERRITE BEADS			
	N30-3006-41	SCREW, PAN HD	M3X6		
	R92-0150-05	JUMPING RES.	ZERO OHM(10MM)		
	R92-1061-05	JUMPING RES.	ZERO OHM (5MM)		
	S29-4503-05	ROTARY SWITCH WITH V.R.			
C001	CC45FCH1H010C	CAP. CERAMIC	1P	0.25P	50V
C002	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C003	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C004	CQ92FM1H223K	CAP. MYLAR	0.022	10%	50V
C005	CC45FSL1H221J	CAP. CERAMIC	220P	5%	50V
C006	CQ92FM1H222K	CAP. MYLAR	2200P	10%	50V
C007	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C008	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C009	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C013	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C016	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C019	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C020	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C021	CS15E1V010M	CAP. TANTALUM	1	20%	35V
C022	CS15E1V010M	CAP. TANTALUM	1	20%	35V
C023	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C024	CE04BW1E220M	CAP. ELECTRO	22	20%	25V
C025	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C026	CE04EW1E470M	CAP. ELECTRO	47	20%	25V
C027	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C028	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C029	CQ92FM1H223K	CAP. MYLAR	0.022	10%	50V
C030	CC45FCH1H150J	CAP. CERAMIC	15P	5%	50V
C031	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C032	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C033	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C034	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C035	NO USE				
C036	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C037	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C038	NO USE				
C039	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C040	CS15E1V100M	CAP. TANTALUM	10	20%	35V
C041	C91-1303-05	CAP. CERAMIC	0.1	10%	50V
C042	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C043	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C046	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C051	CC45FSL1H151J	CAP. CERAMIC	150P	5%	50V
C052	NO USE				
C053	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C101	CC45FCH1H100D	CAP. CERAMIC	10P	0.5P	50V
C102	C91-1304-05	CAP. 3-TERMINAL	270P	20%	100V
C103	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C104	CC45FSL1H271J	CAP. CERAMIC	270P	5%	50V
C105	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C106	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C107	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C108	CC45CH1H820J	CAP. CERAMIC	82P	5%	50V
C109	C91-0574-05	CAP. MYLAR	1	5%	100V
C110	CC45FCH1H120J	CAP. CERAMIC	12P	5%	50V
C111	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C112	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C113	CC45FSL1H221J	CAP. CERAMIC	220P	5%	50V
C114	CE04EW1H010M	CAP. ELECTRO	1	20%	50V
C115	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C116	CQ92FM1H683K	CAP. MYLAR	0.068	10%	50V
C117	CQ92FM1H472K	CAP. MYLAR	4700P	10%	50V
C118	CE04EW1E101M	CAP. ELECTRO	100	20%	25V
C119	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C120	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C121	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V

REF.NO	PARTS NO	NAME & DESCRIPTION			
C122	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C123	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C124	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C125	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C126	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C127	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C128	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C129	CS15E1C3R3M	CAP. TANTALUM	3.3	20%	16V
C130	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C201	C91-1304-05	CAP. 3-TERMINAL	270P	20%	100V
C202	CC45FSL1H271J	CAP. CERAMIC	270P	5%	50V
C203	CS15E1C3R3M	CAP. TANTALUM	3.3	20%	16V
C204	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C205	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C206	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C207	CC45CH1H820J	CAP. CERAMIC	82P	5%	50V
C208	C91-0574-05	CAP. MYLAR	1	5%	100V
C209	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C210	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C211	CC45FCH1H120J	CAP. CERAMIC	12P	5%	50V
C212	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C213	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C214	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C215	CC45FCH1H100D	CAP. CERAMIC	10P	0.5P	50V
C216	CE04BW1C100M	CAP. ELECTRO	10	20%	16V
C217	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C218	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C219	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C220	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C221	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C222	CC45FSL1H151J	CAP. CERAMIC	150P	5%	50V
C223	CC45FSL1H471J	CAP. CERAMIC	470P	5%	50V
C224	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C225	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C226	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C227	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C228	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C229	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C230	CC45FSL1H271J	CAP. CERAMIC	270P	5%	50V
C231	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C232	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C233	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C401	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C402	CC45FSL1H561J	CAP. CERAMIC	560P	5%	50V
C403	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C404	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C405	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C406	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C407	CK45B2H103K	CAP. CERAMIC	0.01	10%	500V
C408	C91-1266-05	CAP. CERAMIC	1000P		6KV
C409	C91-1266-05	CAP. CERAMIC	1000P		6KV
C410	C91-1266-05	CAP. CERAMIC	1000P		6KV
C411	CK45B2H103K	CAP. CERAMIC	0.01	10%	500V
C412	C91-1266-05	CAP. CERAMIC	1000P		6KV
C413	C91-1266-05	CAP. CERAMIC	1000P		6KV
C414	C91-1267-05	CAP. CERAMIC	4700P		3KV
C415	CK45B2H103K	CAP. CERAMIC	0.01	10%	500V
C416	C91-1267-05	CAP. CERAMIC	4700P		3KV
C417	CE04EW1H010M	CAP. ELECTRO	1	20%	50V
C418	CK45FB1H222K	CAP. CERAMIC	2200P	10%	50V
C419	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C420	NO USE				
C421	CE04EW1E101M	CAP. ELECTRO	100	20%	25V
C422	C91-1264-05	CAP. CERAMIC	22P		3KV
C423	C91-1267-05	CAP. CERAMIC	4700P		3KV
C424	C91-1267-05	CAP. CERAMIC	4700P		3KV
C425	C91-1267-05	CAP. CERAMIC	4700P		3KV
C426	CE04W2C010M	CAP. ELECTRO	1	20%	160V
C427	CE04W2C100M	CAP. ELECTRO	10	20%	160V
C428	CK45B2H103K	CAP. CERAMIC	0.01	10%	500V
C429	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C430	CK45B2H103K	CAP. CERAMIC	0.01	10%	500V
C431	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C432	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C433	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C434	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C435	CK45B2H103K	CAP. CERAMIC	0.01	10%	500V
C436	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C501	CC45FSL1H331J	CAP. CERAMIC	330P	5%	50V
C502	NO USE				
C503	CK45FF1H103Z	CAP. CERAMIC	0.01		50V

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
C504	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C505	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C506	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C507	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C508	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C509	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C510	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C511	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C701	CE04EW1H100M	CAP. ELECTRO	10	20%	50V
C702	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C703	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C801	CC45CH1H020C	CAP. CERAMIC	2P	0.25P	50V
C802	CC45SL1H681J	CAP. CERAMIC	680P	5%	50V
C803	CC45SL1H221J	CAP. CERAMIC	220P	5%	50V
C804	CC45SL1H271J	CAP. CERAMIC	270P	5%	50V
C805	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C806	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C807	CE04EW1E100M	CAP. ELECTRO	10	20%	25V
C901	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C902	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C903	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C904	CC45SL1H561J	CAP. CERAMIC	560P	5%	50V
C905	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C906	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C907	CC45CH1H050C	CAP. CERAMIC	5P	0.25P	50V
C908	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C909	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
C910	CC45CH1H030C	CAP. CERAMIC	3P	0.25P	50V
C911	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
D001	1SS132	DIODE			
D002	1SS132	DIODE			
D003	1SS132	DIODE			
D004	1SS132	DIODE			
D005	1SS132	DIODE			
D006	1SS132	DIODE			
D007	HZS5.6J(B2)	DIODE, ZENER	5.62V		
D008	1SS86	DIODE			
D009	1SS132	DIODE			
D010	1SS132	DIODE			
D011	1SS132	DIODE			
D012	1SS132	DIODE			
D013	1SS132	DIODE			
D014	1SS132	DIODE			
D015	1SS132	DIODE			
D101	1SS132	DIODE			
D102	1SS132	DIODE			
D103	1SS132	DIODE			
D104	1SS132	DIODE			
D105	1SS132	DIODE			
D106	1SS132	DIODE			
D107	1SS132	DIODE			
D108	1SS132	DIODE			
D109	1SS132	DIODE			
D110	1SS132	DIODE			
D111	1SS132	DIODE			
D112	1SS132	DIODE			
D113	NO USE				
D114	1SS132	DIODE			
D115	1SS132	DIODE			
D116	1SS132	DIODE			
D117	1SS132	DIODE			
D201	1SS132	DIODE			
D202	1SS132	DIODE			
D203	1SS132	DIODE			
D204	1SS132	DIODE			
D205	1SS132	DIODE			
D206	1SS132	DIODE			
D207	1SS132	DIODE			
D208	1SS132	DIODE			
D209	1SS132	DIODE			
D210	1SS132	DIODE			
D211	1SS86	DIODE			
D212	1SS132	DIODE			
D213	1SS132	DIODE			
D214	1SS132	DIODE			
D215	1SS132	DIODE			
D216	1SS86	DIODE			
D217	1SS132	DIODE			

REF.NO	PARTS NO	NAME & DESCRIPTION	
D218	1SS132	DIODE	
D219	1SS132	DIODE	
D220	1SS132	DIODE	
D221	1SS132	DIODE	
D222	1SS132	DIODE	
D401	HZ2(B3)	DIODE, ZENER	2.2V
D402	HZ2(B3)	DIODE, ZENER	2.2V
D403	1SS132	DIODE	
D404	1SS83	DIODE	
D405	1SS83	DIODE	
D406	1SS83	DIODE	
D407	1SS83	DIODE	
D408	1SS83	DIODE	
D409	1SS83	DIODE	
D410	1SS83	DIODE	
D411	1SS83	DIODE	
D412	1SS132	DIODE	
D413	HZS5.6J(B2)	DIODE, ZENER	5.62V
D414	NO USE		
D415	1SS132	DIODE	
D416	1SS132	DIODE	
D417	Y10GA	DIODE	
D424	MTZ30JC	DIODE, ZENER	29.09V
D425	HZ36-2L	DIODE	
D426	HZ36-2L	DIODE	
D427	HZ36-2L	DIODE	
D428	B30-0957-05	LED (LN322GPT)	
D505	1SS132	DIODE	
D506	1SS132	DIODE	
D507	1SS132	DIODE	
D901	1SS132	DIODE	
J014	L40-2292-02	FERRI INDUCTOR	2.2UH 20%
JW001	E31-5659-05	LEAD WIRE WITH CONNECTOR	
JW002	E31-5660-05	LEAD WIRE WITH CONNECTOR	
JW007	E31-5671-05	LEAD WIRE WITH CONNECTOR	
JW014	E31-5672-05	LEAD WIRE WITH CONNECTOR	
JW021	E31-5673-05	LEAD WIRE WITH CONNECTOR	
JW901	E31-5689-05	LEAD WIRE WITH CONNECTOR	
JW902	E31-5719-05	LEAD WIRE WITH CONNECTOR	
L101	L40-2292-02	FERRI INDUCTOR	2.2UH 20%
L201	L40-2292-02	FERRI INDUCTOR	2.2UH 20%
L401	L40-1011-13	FERRI INDUCTOR	100UH 10%
L402	L40-2292-02	FERRI INDUCTOR	2.2UH 20%
L403	L40-2292-02	FERRI INDUCTOR	2.2UH 20%
L404	L40-2292-02	FERRI INDUCTOR	2.2UH 20%
NE401	NE-2B	NEON LAMP	
NE402	NE-2B	NEON LAMP	
P004	E40-0273-05	PIN CONNECTOR	2P
P005	E40-0273-05	PIN CONNECTOR	2P
P010	E40-0573-05	PIN CONNECTOR	5P
P022	E40-0673-05	PIN CONNECTOR	6P
P023	E23-0401-05	PIN TERMINAL	
P024	E40-0373-05	PIN CONNECTOR	3P
P025	E40-0573-05	PIN CONNECTOR	5P
P026	E40-0273-05	PIN CONNECTOR	2P
P027	E40-0273-05	PIN CONNECTOR	2P
P028	E40-0373-05	PIN CONNECTOR	3P
P029	NO USE		
P030	E40-0273-05	PIN CONNECTOR	2P
P031	E40-0373-05	PIN CONNECTOR	3P
P032	E23-0401-05	PIN TERMINAL	
P033	E40-0573-05	PIN CONNECTOR	5P
P037	E40-0373-05	PIN CONNECTOR	3P
P038	E40-0473-05	PIN CONNECTOR	4P
P039	E40-0473-05	PIN CONNECTOR	4P

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION
P040	NO USE	
P041	E40-0273-05	PIN CONNECTOR 2P
P042	E40-0373-05	PIN CONNECTOR 3P
P043	NO USE	
P044	E40-7033-05	PIN CONNECTOR 2P
P045	E40-7032-05	PIN CONNECTOR 5P
P046	E40-0373-05	PIN CONNECTOR 3P
P047	E40-0273-05	PIN CONNECTOR 2P
P048	E40-0273-05	PIN CONNECTOR 2P
P049	E40-0273-05	PIN CONNECTOR 2P
P050	E40-0473-05	PIN CONNECTOR 4P
P051	E40-0273-05	PIN CONNECTOR 2P
P052	E40-0473-05	PIN CONNECTOR 4P
P053	E40-0273-05	PIN CONNECTOR 2P
P054	E23-0401-05	PIN TERMINAL
P063	E23-0401-05	PIN TERMINAL
P071	E40-0373-05	PIN CONNECTOR 3P
P080	E40-0673-05	PIN CONNECTOR 6P
P801	E40-0216-05	PIN CONNECTOR 2P
Q001	2SA1206	TR. SI, PNP
Q002	2SA1206	TR. SI, PNP
Q003	2SC1907	TR. SI, NPN
Q004	2SC1907	TR. SI, NPN
Q005	2SK304(E)	FET, N-CHANNEL
Q006	NO USE	
Q007	2SA1206	TR. SI, PNP
Q008	2SA1206	TR. SI, PNP
Q009	2SA838(B)	TR. SI, PNP
Q010	2SA838(B)	TR. SI, PNP
Q011	2SC945(Q)	TR. SI, NPN
Q012	2SK117(BL)	FET, N-CHANNEL
Q013	2SA1005(K)	TR. SI, PNP
Q014	2SA1015(Y)	TR. SI, PNP
Q015	2SC1907	TR. SI, NPN
Q016	2SA1005(K)	TR. SI, PNP
Q017	2SC1907	TR. SI, NPN
Q018	2SC945(Q)	TR. SI, NPN
Q019	2SC945(Q)	TR. SI, NPN
Q020	2SC945(Q)	TR. SI, NPN
Q021	2SA844(D)	TR. SI, PNP
Q022	2SC945(Q)	TR. SI, NPN
Q101	2SA844(D)	TR. SI, PNP
Q102	2SA844(D)	TR. SI, PNP
Q103	2SA844(D)	TR. SI, PNP
Q104	2SA838(B)	TR. SI, PNP
Q105	2SC1345(E)	TR. SI, NPN
Q106	2SK170(V)	FET, N-CHANNEL
Q107	2SK304(F)	FET, N-CHANNEL
Q108	2SC1907	TR. SI, NPN
Q109	2SA1015(Y)	TR. SI, PNP
Q110	2SA844(D)	TR. SI, PNP
Q111	2SA1175(F)	TR. SI, PNP
Q112	2SC945(Q)	TR. SI, NPN
Q113	2SC945(Q)	TR. SI, NPN
Q114	2SC945(Q)	TR. SI, NPN
Q201	2SA844(D)	TR. SI, PNP
Q202	2SA844(D)	TR. SI, PNP
Q203	2SA844(D)	TR. SI, PNP
Q204	2SA838(B)	TR. SI, PNP
Q205	2SC1345(E)	TR. SI, NPN
Q206	2SK170(V)	FET, N-CHANNEL
Q207	2SK304(F)	FET, N-CHANNEL
Q208	2SC1907	TR. SI, NPN
Q209	2SA1015(Y)	TR. SI, PNP
Q210	2SA1015(Y)	TR. SI, PNP
Q211	2SA844(D)	TR. SI, PNP
Q212	2SC945(Q)	TR. SI, NPN
Q213	UPA68H	
Q214	2SC945(Q)	TR. SI, NPN
Q215	2SA844(D)	TR. SI, PNP
Q216	2SA844(D)	TR. SI, PNP
Q217	2SC945(Q)	TR. SI, NPN
Q218	2SA1005(K)	TR. SI, PNP
Q219	2SA1005(K)	TR. SI, PNP
Q220	2SC945(Q)	TR. SI, NPN
Q221	2SC945(Q)	TR. SI, NPN

REF.NO	PARTS NO	NAME & DESCRIPTION
Q401	2SA1005(K)	TR. SI, PNP
Q402	2SA1005(K)	TR. SI, PNP
Q403	2SC1907	TR. SI, NPN
Q404	2SC1907	TR. SI, NPN
Q405	2SD668A(C)	TR, SI, NPN
Q406	2SD668A(C)	TR, SI, NPN
Q407	2SD668A(C)	TR, SI, NPN
Q408	2SD668A(C)	TR, SI, NPN
Q409	2SD880(Y)	TR. SI, NPN
Q410	2SC945(Q)	TR. SI, NPN
Q411	2SA1015(Y)	TR. SI, PNP
Q505	2SA1005(K)	TR. SI, PNP
Q506	2SC945(Q)	TR. SI, NPN

REF.NO	PARTS NO	NAME & DESCRIPTION			
R001	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R002	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R003	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R004	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R005	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R006	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R007	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R008	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R009	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R010	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R011	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R012	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R013	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R014	RN14BK2E1004F	RES. METAL FILM	1M	1%	1/4W
R015	RD14BB2C474J	RES. CARBON	470K	5%	1/6W
R016	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R027	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R028	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R029	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R030	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R031	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R032	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R033	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R034	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R035	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R036	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R037	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R040	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R041	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R042	RD14BB2C620J	RES. CARBON	62	5%	1/6W
R043	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R044	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R045	NO USE				
R046	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R047	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R048	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R049	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R050	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R051	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R052	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R053	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R054	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R055	NO USE				
R056	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R057	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R058	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R059	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R060	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R061	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R062	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R063	RD14BB2C224J	RES. CARBON	220K	5%	1/6W
R064	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R065	L40-1091-03	FERRI INDUCTOR	1UH		
R066	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R067	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R068	RD14BB2E101J	RES. CARBON	100	5%	1/4W
R069	RD14BB2C183J	RES. CARBON	18K	5%	1/6W
R070	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R071	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R072	RD14BB2C474J	RES. CARBON	470K	5%	1/6W
R073	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R074	RD14BB2C103J	RES. CARBON.	10K	5%	1/6W
R075	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R076	RD14BB2E102J	RES. CARBON	1K	5%	1/4W
R077	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R078	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R079	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R080	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R081	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R082	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R083	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R084	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R085	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R086	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R087	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R088	RD14BB2C271J	RES. CARBON	270	5%	1/6W
R089	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R090	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R091	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R092	RD14BB2C271J	RES. CARBON	270	5%	1/6W
R093	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R094	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R095	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R096	RD14BB2C911J	RES. CARBON	910	5%	1/6W
R097	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R098	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R099	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R100	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R101	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R102	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R103	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R104	RD14BB2E151J	RES. CARBON	150	5%	1/4W
R105	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R106	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R107	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R108	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R109	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R110	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R111	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R112	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R113	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R114	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R115	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R116	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R117	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R118	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R119	RD14BB2C183J	RES. CARBON	18K	5%	1/6W
R120	RD14BB2C121J	RES. CARBON	120	5%	1/6W
R121	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
R122	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R123	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R124	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R125	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R126	RN14BK2E3004F	RES. METAL FILM	3M	1%	1/4W
R127	RN14BK2C1004F	RES. METAL FILM	1M	1%	1/6W
R128	RN14BK2C5003F	RES. METAL FILM	500K	1%	1/6W
R129	RN14BK2C3003F	RES. METAL FILM	300K	1%	1/6W
R130	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R131	RN14BK2C5002F	RES. METAL FILM	50K	1%	1/6W
R132	RN14BK2C3002F	RES. METAL FILM	30K	1%	1/6W
R133	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R134	RN14BK2C5001F	RES. METAL FILM	5K	1%	1/6W
R135	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R136	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R137	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R138	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R139	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R140	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R141	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R142	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R143	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R144	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R145	RD14BB2E101J	RES. CARBON	100	5%	1/4W
R146	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R147	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R148	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R149	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R150	RD14BB2E102J	RES. CARBON	1K	5%	1/4W
R151	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R152	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R153	RD14BB2C180J	RES. CARBON	18	5%	1/6W
R154	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R155	RD14BB2E100J	RES. CARBON	10	5%	1/4W
R156	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R157	RN14BK2C2202F	RES. METAL FILM	22K	1%	1/6W
R158	RN14BK2C3002F	RES. METAL FILM	30K	1%	1/6W
R201	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R202	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R203	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W

REF.NO	PARTS NO	NAME & DESCRIPTION			
R204	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R205	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R206	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R207	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R208	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R209	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R210	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R211	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R212	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R213	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R214	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R215	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R216	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R217	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R218	RD14BB2C183J	RES. CARBON	18K	5%	1/6W
R219	RD14BB2C121J	RES. CARBON	120	5%	1/6W
R220	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
R221	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R222	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R223	RN14BK2C1202F	RES. METAL FILM	12K	1%	1/6W
R224	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R225	RN14BK2E3004F	RES. METAL FILM	3M	1%	1/4W
R226	RN14BK2C1004F	RES. METAL FILM	1M	1%	1/6W
R227	RN14BK2C5003F	RES. METAL FILM	500K	1%	1/6W
R228	RN14BK2C3003F	RES. METAL FILM	300K	1%	1/6W
R229	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R230	RN14BK2C5002F	RES. METAL FILM	50K	1%	1/6W
R231	RN14BK2C3002F	RES. METAL FILM	30K	1%	1/6W
R232	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R233	RN14BK2C5001F	RES. METAL FILM	5K	1%	1/6W
R234	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R235	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R236	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R237	RN14BK2C2202F	RES. METAL FILM	22K	1%	1/6W
R238	RN14BK2C3002F	RES. METAL FILM	30K	1%	1/6W
R239	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R240	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R241	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R242	RD14BB2C153J	RES. CARBON	15K	5%	1/6W
R243	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R244	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R245	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R246	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R247	RD14BB2C563J	RES. CARBON	56K	5%	1/6W
R248	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R249	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R250	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R251	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R252	RN14BK2C1801F	RES. METAL FILM	1.8K	1%	1/6W
R253	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R254	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R255	RD14BB2E470J	RES. CARBON	47	5%	1/4W
R256	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R257	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R258	RD14BB2E470J	RES. CARBON	47	5%	1/4W
R259	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
P260	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R261	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R262	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R263	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R264	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R265	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R266	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R267	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R268	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R269	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R270	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R271	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R272	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R273	RD14BB2E151J	RES. CARBON	150	5%	1/4W
R274	RD14BB2E181J	RES. CARBON	180	5%	1/4W
R275	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R276	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R277	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R278	RD14BB2E103J	RES. CARBON	10K	5%	1/4W
R401	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R402	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R403	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R404	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R405	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R406	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R407	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R408	RD14BB2C331J	RES. CARBON	330	5%	1/6W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R409	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R410	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R411	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R412	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R413	RD14BB2C201J	RES. CARBON	200	5%	1/6W
R414	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R415	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R416	RD14DB2H473J	RES. CARBON	47K	5%	1/2W
R417	RS14GB3A333J	RES. METAL FILM	33K	5%	1W
R418	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R419	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R420	RS14GB3A223J	RES. METAL FILM	22K	5%	1W
R421	RD14DB2H473J	RES. CARBON	47K	5%	1/2W
R422	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R423	RD14BB2E101J	RES. CARBON	100	5%	1/4W
R424	R92-1057-05	RES. METAL FILM	2.2M	5%	1/2W
R425	R92-1007-05	RES. CARBON	10M	5%	1/2W
R426	R92-1007-05	RES. CARBON	10M	5%	1/2W
R427	RD14BB2E102J	RES. CARBON	1K	5%	1/4W
R428	RD14BB2E102J	RES. CARBON	1K	5%	1/4W
R429	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R430	R92-1057-05	RES. METAL FILM	2.2M	5%	1/2W
R431	RD14BB2E101J	RES. CARBON	100	5%	1/4W
R432	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R433	R92-1057-05	RES. METAL FILM	2.2M	5%	1/2W
R434	R92-1007-05	RES. CARBON	10M	5%	1/2W
R435	R92-1007-05	RES. CARBON	10M	5%	1/2W
R436	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R437	R92-1418-05	RES. METAL	6.8M	1%	1W
R438	R92-1419-05	RES. METAL FILM	10M	1%	1W
R439	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R440	RN14BK2C1203F	RES. METAL FILM	120K	1%	1/6W
R441	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R454	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R455	RD14BB2C393J	RES. CARBON	39K	5%	1/6W
R456	RN14BK2C1202F	RES. METAL FILM	12K	1%	1/6W
R457	NO USE				
R458	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R459	NO USE				
R460	RS14GB3A1R0J	RES. METAL FILM	1	5%	1W
R461	RD14BB2E223J	RES. CARBON	22K	5%	1/4W
R462	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R463	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R464	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R465	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R466	RS14GB3A101J	RES. METAL FILM	100	5%	1W
R467	RS14GB3A101J	RES. METAL FILM	100	5%	1W
R468	RS14GB3A102J	RES. METAL FILM	1K	5%	1W
R469	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R517	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R518	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R519	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R520	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R521	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R522	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R523	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R524	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R525	RD14BB2C303J	RES. CARBON	30K	5%	1/6W
R526	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R527	RD14BB2C474J	RES. CARBON	470K	5%	1/6W
R528	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R529	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R530	R90-0665-05	RES. NETWORK	7X10K		
R531	NO USE				
R532	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R701	R90-0664-05	RES. NETWORK	10X10K		
R702	R90-0664-05	RES. NETWORK	10X10K		
R801	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R802	RD14BB2C121J	RES. CARBON	120	5%	1/6W
R901	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R902	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R903	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R904	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
S001	S33-2501-05	LEVER SWITCH 2-5			
S002	S33-2501-05	LEVER SWITCH 2-5			
S101	S33-4503-05	LEVER SWITCH 4-5 (H.MODE)			

REF.NO	PARTS NO	NAME & DESCRIPTION
S202	S32-4009-05	LEVER SWITCH 4-4
S501	S33-2501-05	LEVER SWITCH 2-5
T401	L19-0421-05	CONVERTOR TRANSFORMER
TC101	C05-0454-05	CAP. TRIMMER 20PF
TC201	C05-0454-05	CAP. TRIMMER 20PF
U001	CA3127E	IC. TR. ARRY N-P-N
U002	TL081CP	IC. BI-FET O.P AMP
U003	SN74F00N	IC. QUAD 2-INPUT NAND GATE
U101	SN74LS00N	IC. QUAD 2-INPUT NAND GATE
U102	SN74F74N	IC. DUAL D-FLIP-FLOP
U103	TL081CP	IC. BI-FET O.P AMP
U104	TC4053BP	IC. 2-CH ANALOG MULTIPLEXER
U201	SN74F74N	IC. DUAL D-FLIP-FLOP
U202	TL081CP	IC. BI-FET O.P AMP
U203	SN74LS112AN	IC. DUAL JK-FF
U401	LF13741N	IC. MONOLITHIC JFET INPUT OP
U501	TC74HC123AP	IC.DUAL RETRIGG. MOND. MULTIVI
U502	NJM4558D	IC. DUAL OP AMP
U701	DTM-5020	IC. GATE ARRAY
U702	DTM-5020	IC. GATE ARRAY
VR001	R12-0577-05	RES. SEMI FIXED 500 B
VR002	R12-2522-05	RES. SEMI FIXED 5K B
VR003	R12-0575-05	RES. SEMI FIXED 100 B
VR004	R12-0576-05	RES. SEMI FIXED 200 B
VR101	R12-3549-05	RES. SEMI FIXED 10K B
VR102	R06-3502-05	V.R. 10K B
VR201	R12-3549-05	RES. SEMI FIXED 10K B
VR202	R12-3549-05	RES. SEMI FIXED 10K B
VR203	R12-0577-05	RES. SEMI FIXED 500 B
VR204	R12-1545-05	RES. SEMI FIXED 1K B
VR401	R12-4516-05	RES. SEMI FIXED 50K B
VR402	R12-8501-05	RES. SEMI FIXED 2.2M B
VR403	R12-3549-05	RES. SEMI FIXED 10K B
W001	W02-0474-05	HIGH VOLTAGE BLOCK

PARTS LIST

R/O UNIT

(X77-1510-01)

REF.NO	PARTS NO	NAME & DESCRIPTION			
	J2S-5232-02	PCB (UNMOUNTED)			
C001	CE04EW1A470M	CAP. ELECTRO	47	20%	10V
C002	C91-1245-05	CAP. CERAMIC	0.1		12V
C003	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C004	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C005	NO USE				
C006	CC45FSL1H331J	CAP. CERAMIC	330P	5%	50V
C007	CC45FCH1H680J	CAP. CERAMIC	68P	5%	50V
C008	CF92FV1H334J	CAP. POLYESTER	0.33	5%	50V
C009	CF92FV1H334J	CAP. POLYESTER	0.33	5%	50V
C010	CF92FV1H334J	CAP. POLYESTER	0.33	5%	50V
C011	CF92FV1H334J	CAP. POLYESTER	0.33	5%	50V
C012	NO USE				
C013	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C016	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C017	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C018	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C019	CE04EW1C220M	CAP. ELECTRO	22	20%	16V
C020	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C021	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C022	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C023	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C024	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C025	CE04EW1C220M	CAP. ELECTRO	22	20%	16V
C026	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C027	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C028	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C029	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C030	CE04EW1C220M	CAP. ELECTRO	22	20%	16V
C031	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C032	C91-1245-05	CAP. CERAMIC	0.1		12V
C033	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C034	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C035	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C036	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C037	CE04EW1C220M	CAP. ELECTRO	22	20%	16V
C038	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C039	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C042	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C043	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C046	C91-1245-05	CAP. CERAMIC	0.1		12V
C047	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C048	CE04EW1C220M	CAP. ELECTRO	22	20%	16V
C049	CE04EW1C220M	CAP. ELECTRO	22	20%	16V
C050	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C051	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C052	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C053	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C054	CE04EW1A101M	CAP. ELECTRO	100	20%	10V
C055	NO USE				
C056	C91-1245-05	CAP. CERAMIC	0.1		12V
C057	C91-1245-05	CAP. CERAMIC	0.1		12V
C058	C91-1245-05	CAP. CERAMIC	0.1		12V
C059	C91-1245-05	CAP. CERAMIC	0.1		12V
C060	C91-1245-05	CAP. CERAMIC	0.1		12V
C061	C91-1245-05	CAP. CERAMIC	0.1		12V
C062	C91-1245-05	CAP. CERAMIC	0.1		12V
C066	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C067	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C068	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C071	C91-1249-05	CAP. NETWORK	0.01X13		
C072	C91-1249-05	CAP. NETWORK	0.01X13		
C073	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C074	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C075	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C076	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C077	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C078	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C079	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C080	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C081	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C082	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C083	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C084	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C085	CK45FF1H103Z	CAP. CERAMIC	0.01		50V

REF.NO	PARTS NO	NAME & DESCRIPTION			
C901	CK45F1H103Z	CAP. CERAMIC	0.01		50V
D001	MA700	DIODE			
D002	MA700	DIODE			
L001	L40-1011-04	FERRI INDUCTOR	100UH		
P015	E40-0473-05	PIN CONNECTOR	4P		
P016	E40-1373-05	PIN CONNECTOR	13P		
P033	E40-1173-05	PIN CONNECTOR	11P		
P034	NO USE				
P035	E40-0973-05	PIN CONNECTOR	9P		
P057	E40-0473-05	PIN CONNECTOR	4P		
P065	E40-0473-05	PIN CONNECTOR	4P		
P080	E40-1173-05	PIN CONNECTOR	11P		
Q001	2SC2785(F)	TR. SI. NPN			
Q002	2SA1175(F)	TR. SI. PNP			
R001	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R002	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
R005	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R006	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R007	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R008	RN14BK2C1202F	RES. METAL FILM	12K	1%	1/6W
R009	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R010	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
R011	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
R012	RN14BK2C9531F	RES. METAL FILM	9.53K	1%	1/6W
R013	RN14BK2C1301F	RES. METAL FILM	1.3K	1%	1/6W
R014	RN14BK2C9101F	RES. METAL FILM	9.1K	1%	1/6W
R015	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R016	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R017	RN14BK2C9101F	RES. METAL FILM	9.1K	1%	1/6W
R018	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R019	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R020	RN14BK2C3602F	RES. METAL FILM	36K	1%	1/6W
R021	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R022	RN14BK2C7501F	RES. METAL FILM	7.5K	1%	1/6W
R023	RN14BK2C7501F	RES. METAL FILM	7.5K	1%	1/6W
R024	RN14BK2C3602F	RES. METAL FILM	36K	1%	1/6W
R025	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R026	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R027	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R028	NO USE				
R029	RN14BK2C1202F	RES. METAL FILM	12K	1%	1/6W
R030	RN14BK2C1101F	RES. METAL FILM	1.1K	1%	1/6W
R031	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R032	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R033	R90-0654-05	RES. NETWORK	COMPLEX, Y		
R034	NO USE				
R035	RD14BB2C5R6J	RES. CARBON	5.6	5%	1/6W
R036	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R037	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R038	NO USE				
R039	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R040	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R043	R90-0653-05	RES. NETWORK	8X10K	5%	
R044	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R045	NO USE				
R046	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R050	RD14BB2C301J	RES. CARBON	300	5%	1/6W
R051	RD14BB2C301J	RES. CARBON	300	5%	1/6W
R052	RD14BB2C301J	RES. CARBON	300	5%	1/6W
U001	DAC0808LCN	IC.8-BIT D/A CONVERTER			
U002	HD74HC564AP	IC.OCTAL D FLIP-FLOP			
U003	HD74HC244AP	IC.OCTAL BUFFER			
U004	HD14052BP	IC.DUAL ANALOG MULTIPLEXER			
U005	HD14052BP	IC.DUAL ANALOG MULTIPLEXER			
U006	HD14051BP	IC.ANALOG MULTIPLEXER			
U007	MBM27C64*T	IC.CHARACTOR GENERATOR			
U008	CTM5020	IC.GATE ARRAY (R/O CONTROLLER)			
U009	AM6012DC	IC.12-BIT D/A CONVERTER			
U010	NJM311D	IC.COMPARATOR			
U011	NJM4558D	IC. DUAL OP AMP			
U012	R90-0655-05	CR NETWORK			

REF.NO	PARTS NO	NAME & DESCRIPTION
U013	NJM072BD	IC,JFET INPUT OP AMP
U014	HD140518P	IC,ANALOG MULTIPLEXER
U015	NJM4558D	IC, DUAL OP AMP
U016	SN74LS04N	IC,HEX INVERTER
U017	HD74HC138AP	IC,3 TO 8 DECORDER MULTIPLEXER
U018	HD74HC373AP	IC,OCTAL D-LATCHES
U019	SN74LS244N	IC,OCTAL BUFFER
U020	SN74LS244N	IC,OCTAL BUFFER
U021	SN74LS244N	IC,OCTAL BUFFER
U022	SN74LS244N	IC,OCTAL BUFFER
U023	CTM5040	IC, CPU
VR001	R12-1538-05	RES. SEMI FIXED 1KB
VR002	R12-2520-05	RES. SEMI FIXED 5KB
X001	L78-0107-05	CERAMIC RESONATOR (10MHZ)

LINE FILTER UNIT

(X80-1060-04)

REF.NO	PARTS NO	NAME & DESCRIPTION		
	E01-0103-05	CRT SOCKET		
	E31-5532-05	WIRE ASS'Y (P1,G1,K)		
	E31-5674-05	WIRE ASS'Y (+Y,-Y)		
	E31-5675-05	WIRE ASS'Y (+X,-X)		
	E31-5676-05	WIRE ASS'Y (P2,K2)		
	J25-5179-33	PCB (UNMOUNTED)		
	R92-0150-05	JUMPING RES.	ZERO OHM(10MM)	
	R92-1061-05	JUMPING RES.	ZERO OHM (5MM)	
C001	C91-0575-05	CAP. CERAMIC	1000P	4KV
C002	C91-0575-05	CAP. CERAMIC	1000P	4KV
C003	C91-0551-05	CAP. POLYESTER	0.22 10%	630V
C004	CC45CH2H010C	CAP. CERAMIC	1P 0.25P	500V
C005	NO USE			
C006	CK45F1H103Z	CAP. CERAMIC	0.01	50V
C007	CK45F1H103Z	CAP. CERAMIC	0.01	50V
C008	CK45F1H103Z	CAP. CERAMIC	0.01	50V
C009	CK45F1H103Z	CAP. CERAMIC	0.01	50V
C010	CK45B2H103K	CAP. CERAMIC	0.01 10%	500V
C011	CK45B2H103K	CAP. CERAMIC	0.01 10%	500V
C012	CK45B2H103K	CAP. CERAMIC	0.01 10%	500V
C013	CK45F1H103Z	CAP. CERAMIC	0.01	50V
L001	L33-0808-05	CHOKE COIL		
L801	L40-3381-70	FERRI INDUCTOR	0.33UH 10%	
L802	L40-3381-70	FERRI INDUCTOR	0.33UH 10%	
P030	E40-0574-05	PIN CONNECTOR	5P	
P050	E40-0474-05	PIN CONNECTOR	4P	
P051	NO USE			
P052	E40-0474-05	PIN CONNECTOR	4P	
P069	E40-0530-05	PIN CONNECTOR	5P	
P073	E40-0330-05	PIN CONNECTOR	3P	
R001	RD14BY2H225J	RES. CARBON	2.2M 5%	1/2W
R002	RD14BB2C101J	RES. CARBON	100 5%	1/6W
R003	RD14BB2C101J	RES. CARBON	100 5%	1/6W
R801	RD14BB2C471J	RES. CARBON	470 5%	1/6W
R802	RD14BB2C471J	RES. CARBON	470 5%	1/6W
S001	S40-2524-05	PUSH SWITCH (POWER)		
VR001	R10-9508-05	V.R.(INTENSITY) 10KB/20KB		
VR002	R10-9506-05	V.R.(FOCUS/ASTIG) 200KB/100KB		
VR003	R10-9507-05	V.R.(ILLUM/ROTA) 10KB/20KB		

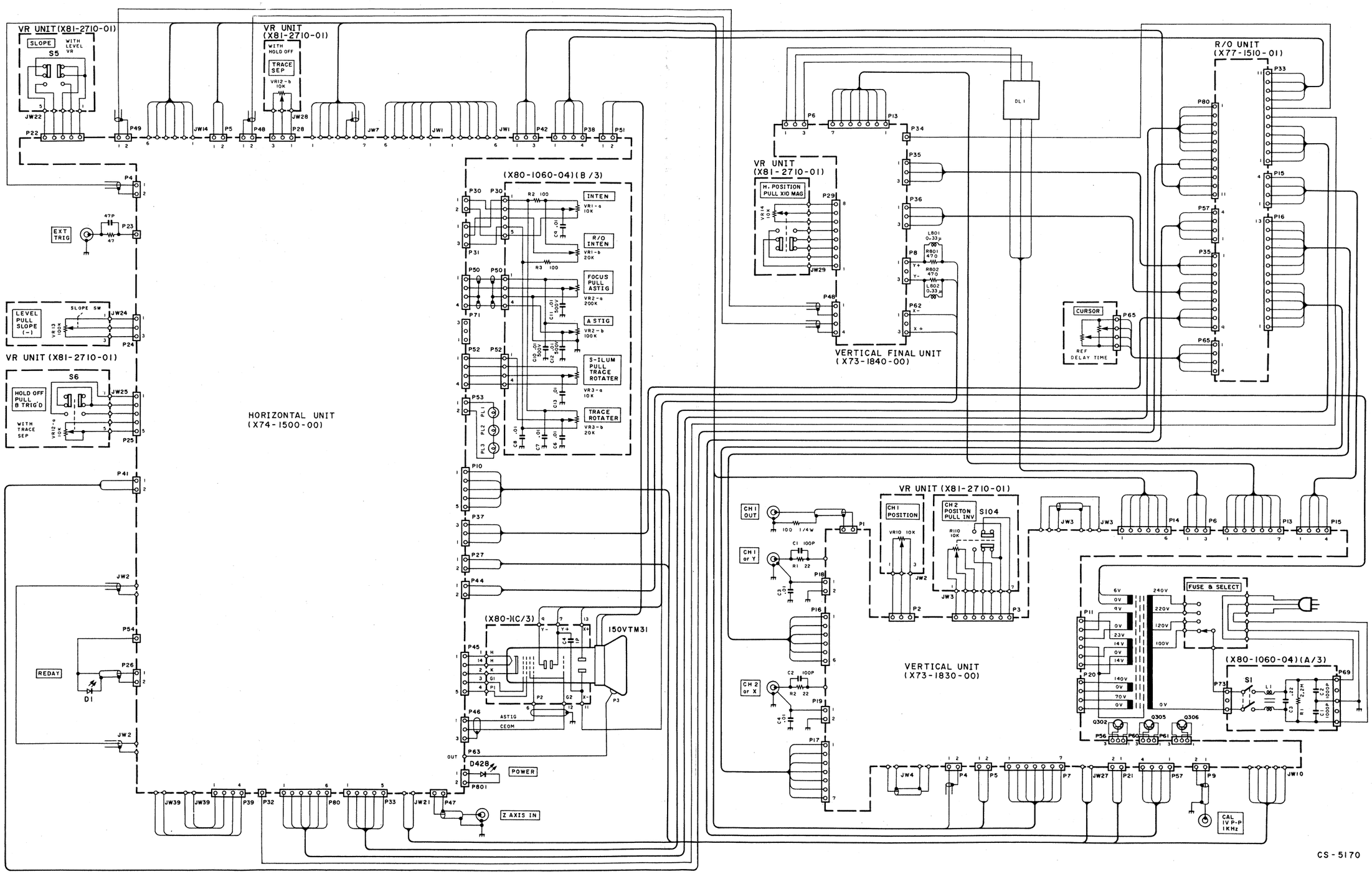
VR UNIT

(X81-2710-01)

REF.NO	PARTS NO	NAME & DESCRIPTION
	J25-5354-03	PCB (UNMOUNTED)
JW002	E31-5503-05	LEAD WIRE WITH CONNECTOR
JW003	E31-5722-05	LEAD WIRE WITH CONNECTOR
JW022	E31-5721-05	LEAD WIRE WITH CONNECTOR
JW023	NO USE	
JW024	E31-5518-05	LEAD WIRE WITH CONNECTOR
JW025	E31-5520-05	LEAD WIRE WITH CONNECTOR
JW028	E31-5522-05	LEAD WIRE WITH CONNECTOR
JW029	E31-5677-15	LEAD WIRE WITH CONNECTOR
VR010	R01-3522-05	V.R. 2X10K B
VR011	NO USE	
VR012	R06-2505-05	VR WITH SWITCH 2X10K B
VR013	R01-5513-05	VR WITH SWITCH 100K B
VR014	R01-3523-05	VR WITH SWITCH 10K B
VR110	R01-3523-05	VR WITH SWITCH 10K B

PARTS LIST

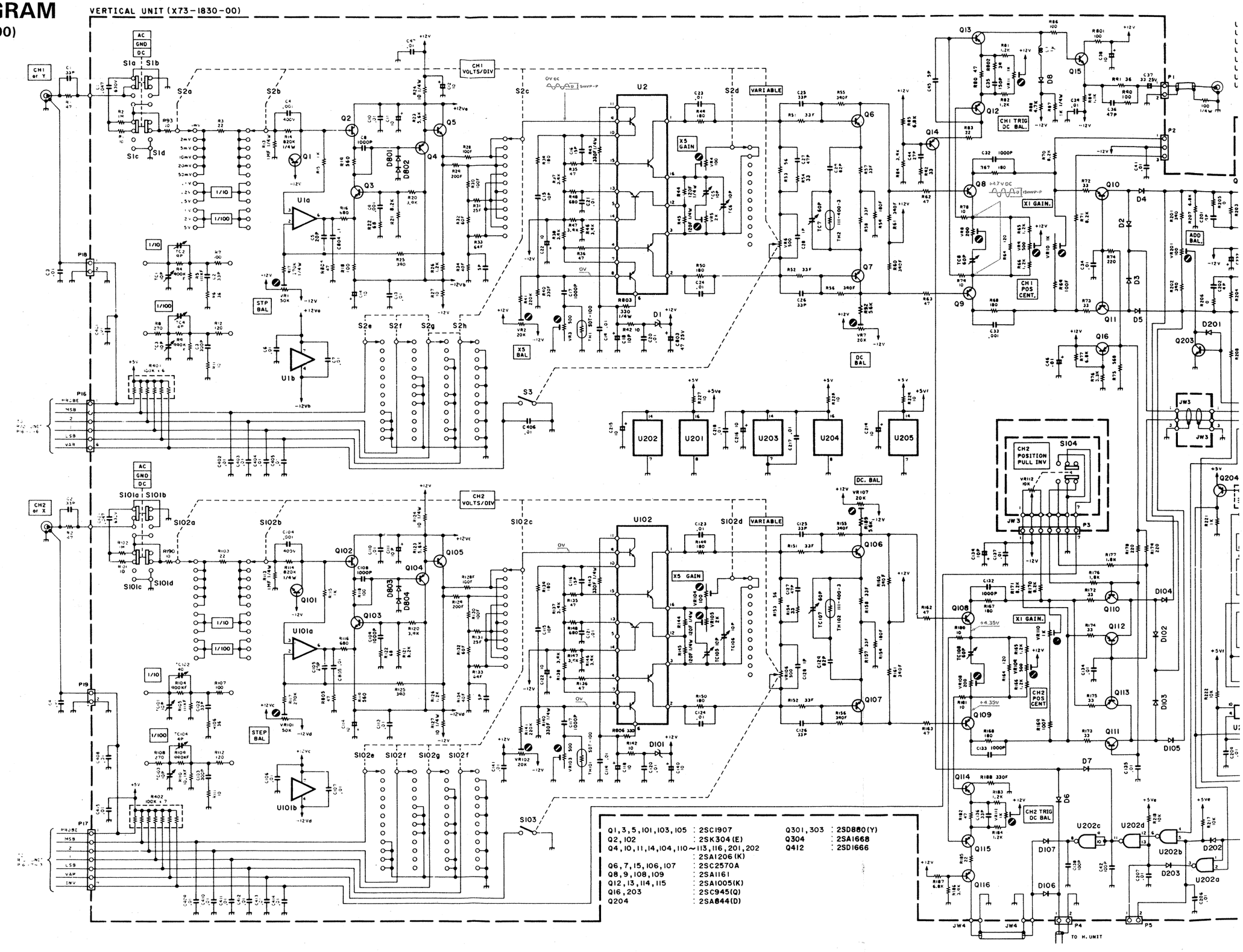
SCHEMATIC DIAGRAM

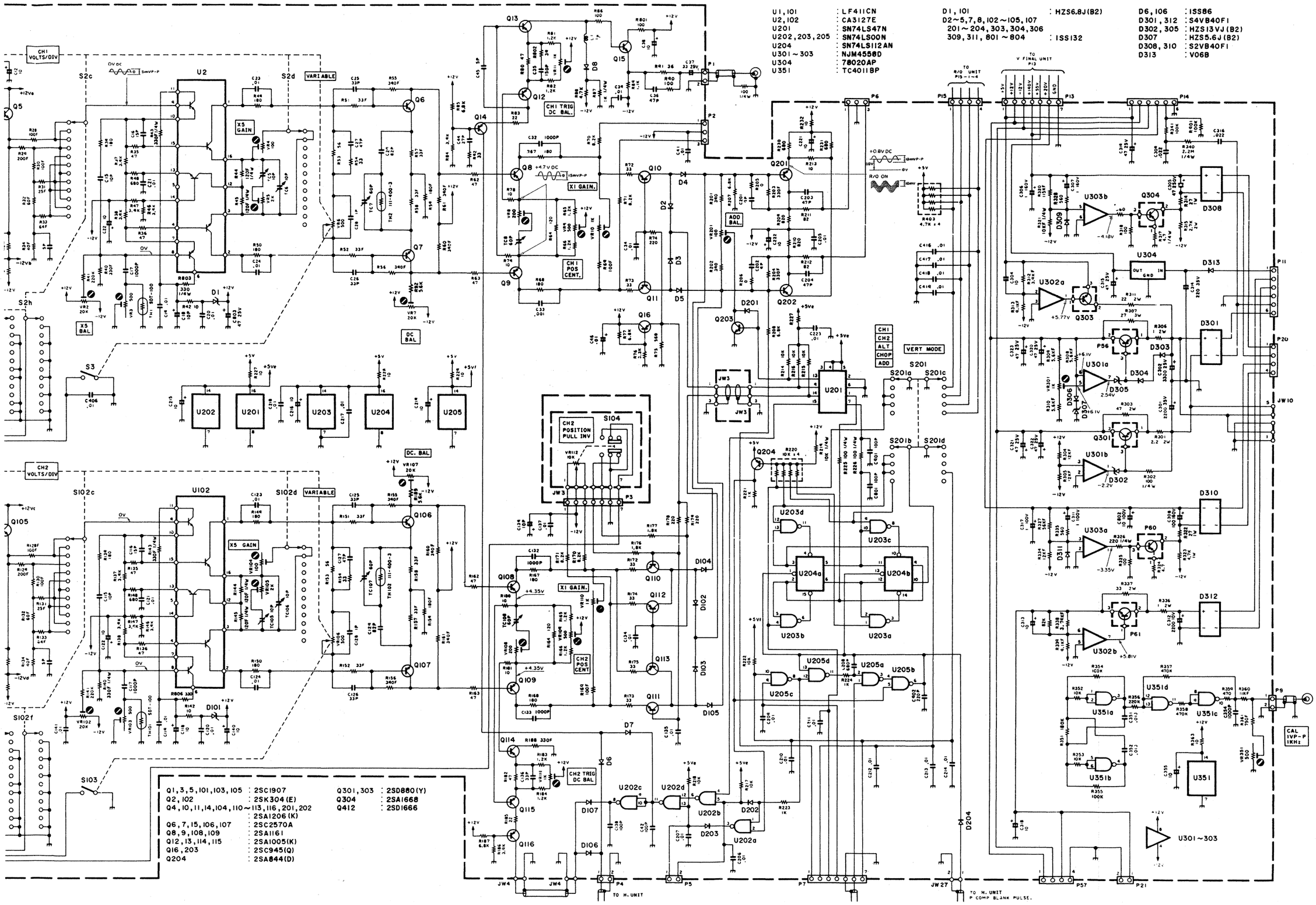


CS-5170

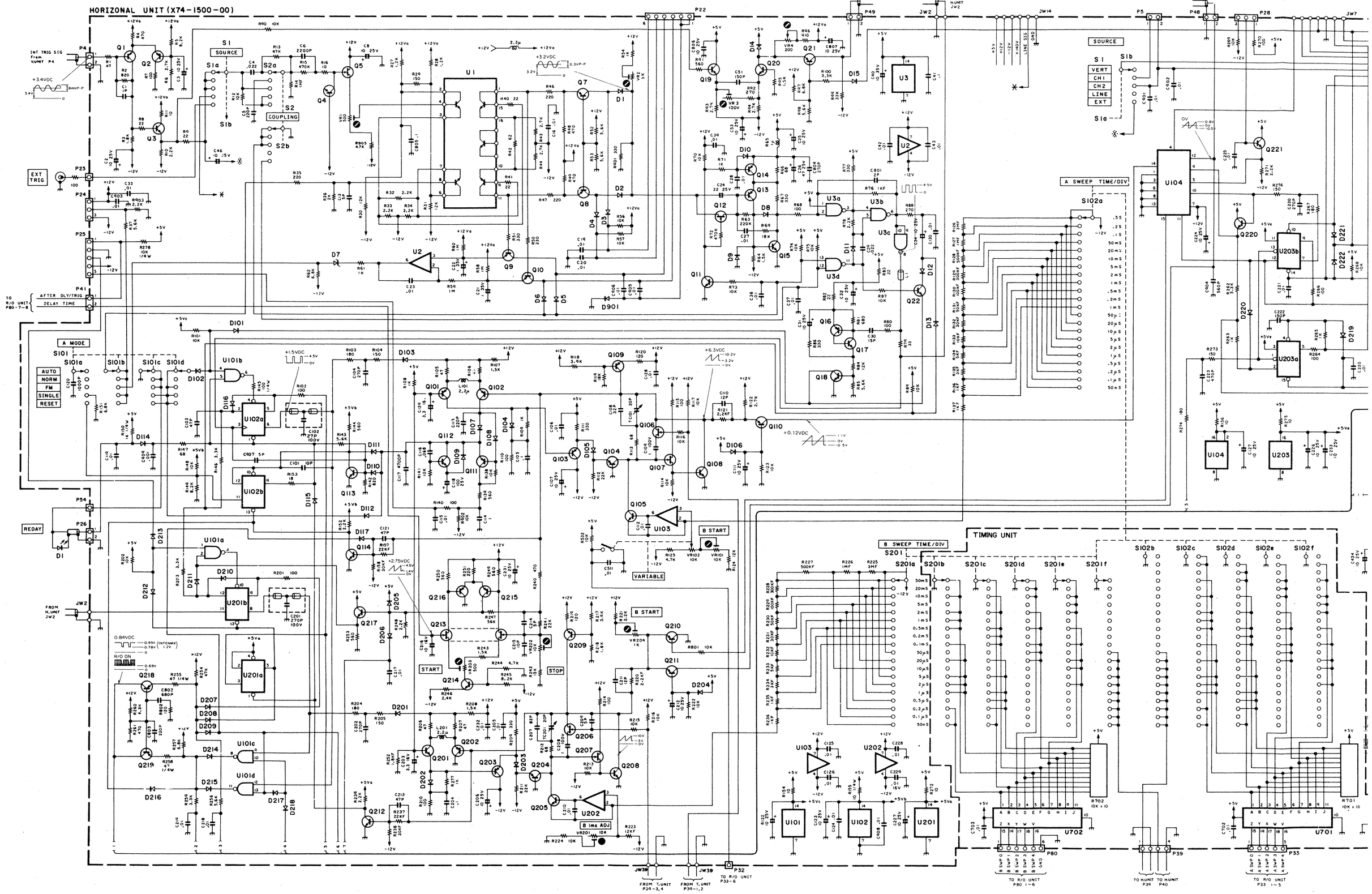
SCHEMATIC DIAGRAM

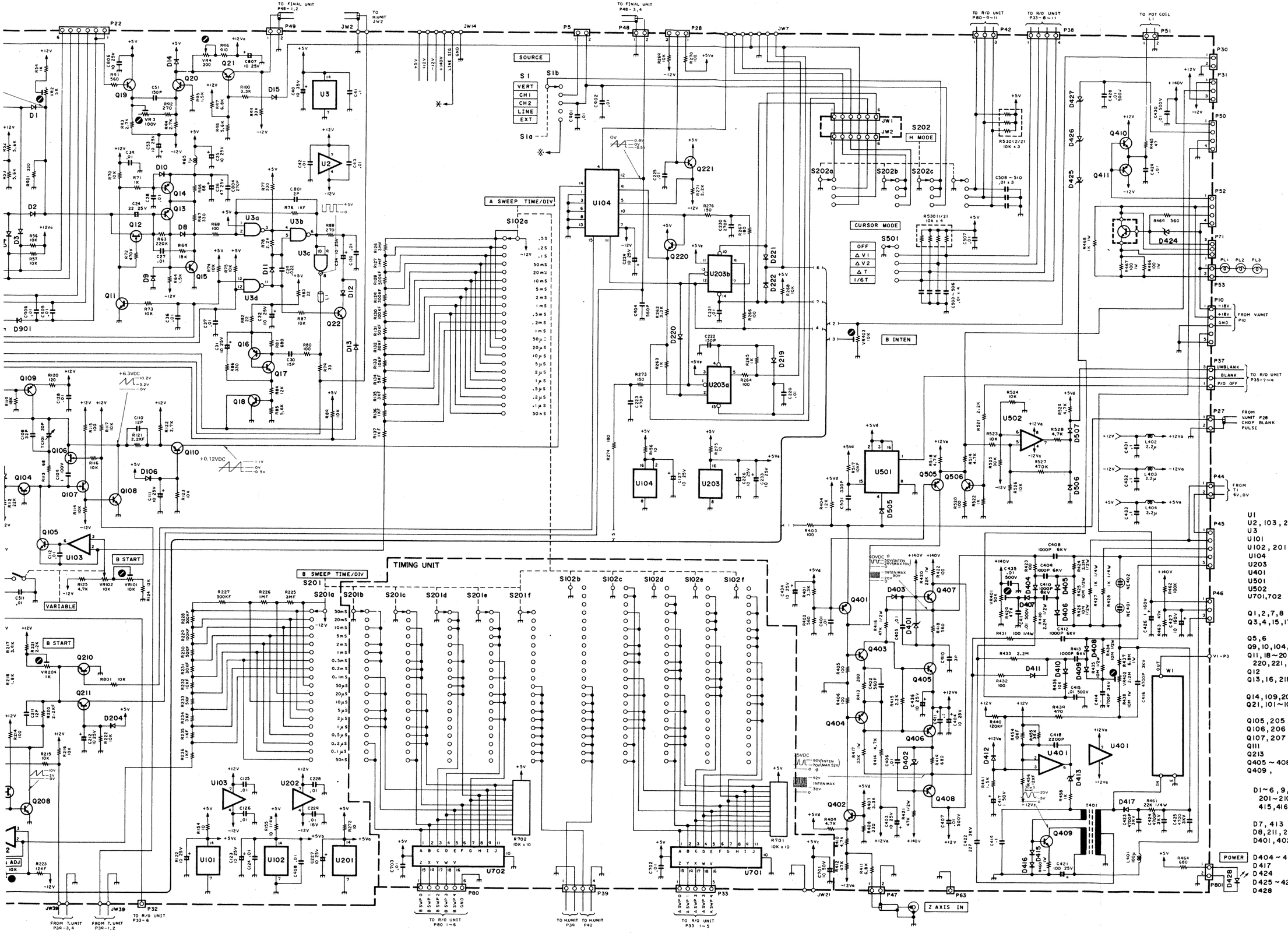
VERTICAL UNIT (X73-1830-00)




CH1 VOLTS/DIV
CH2 VOLTS/DIV
VARIABLE
X5 GAIN
X1 GAIN.
CH1 TRIG DC BAL.
CH1 POS CENT.
CH2 POSITION PULL INV
CH2 TRIG DC BAL
CH2 POS CENT
ADD BAL.
DC BAL
X5 BAL
CH1
CH2
ALT
CHOP
ADD
VERT MODE
TO R/O UNIT P15-1~4
TO V FINAL UNIT P13
R/O ON
CAL 1VP-P 1KHz
TO H. UNIT
TO H. UNIT P COMP BLANK PULSE.
U1,101 : LF411CN
U2,102 : CA3127E
U201 : SN74LS47N
U202,203,205 : SN74LS00N
U204 : SN74LS112AN
U301~303 : NJM4558D
U304 : 78020AP
U351 : TC4011BP
D1,101 : HZS6.8J(B2)
D2~5,7,8,102~105,107 201~204,303,304,306 309,311,801~804 : 1SS132
D6,106 : 1SS86
D301,312 : S4VB40F1
D302,305 : HZS13VJ(B2)
D307 : HZS5.6J(B2)
D308,310 : S2VB40F1
D313 : V06B
Q1,3,5,101,103,105 : 2SC1907
Q2,102 : 2SK304(E)
Q4,10,11,14,104,110~113,116,201,202 : 2SA1206(K)
Q6,7,15,106,107 : 2SC2570A
Q8,9,108,109 : 2SA1161
Q12,13,114,115 : 2SA1005(K)
Q16,203 : 2SC945(Q)
Q204 : 2SA844(D)
Q301,303 : 2SD880(Y)
Q304 : 2SA1668
Q412 : 2SD1666

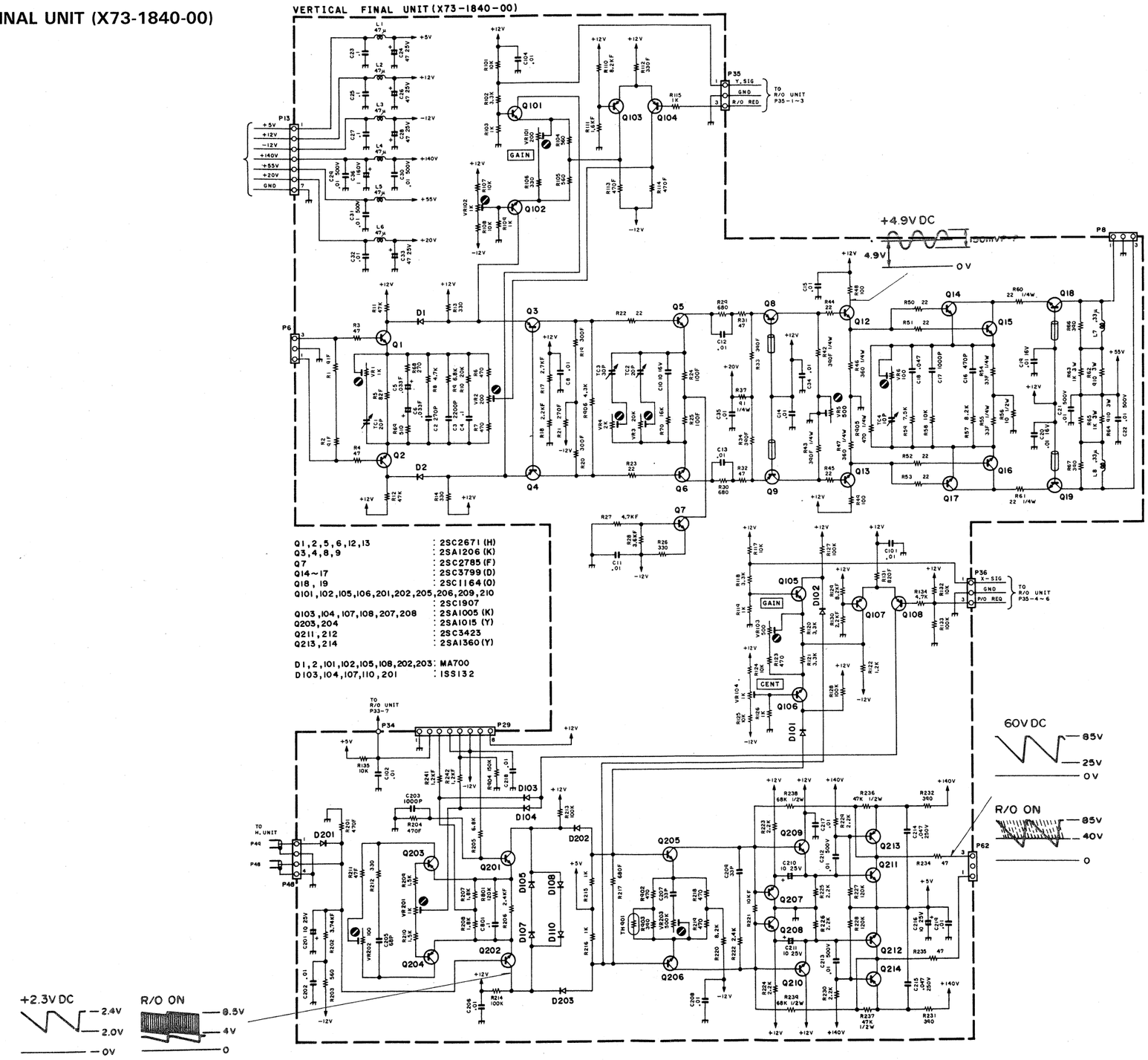
SCHEMATIC DIAGRAM HORIZONTAL UNIT (X74-1500-00)




TIMING UNIT
SOURCE
S1
VERT
CH1
CH2
LINE
EXT
A SWEEP TIME/DIV
S102a
B SWEEP TIME/DIV
S201
CURSOR MODE
S501
OFF
ΔV1
ΔV2
ΔT
1/ΔT
S202
H MODE
B INTEN
B START
VARIABLE
Z AXIS IN
FROM V.UNIT P10
TO R/O UNIT P35-7-9
FROM V.UNIT P28 CHOP BLANK PULSE
FROM T1 6V,0V
TO POT COIL L1
TO FINAL UNIT P48-1,2
TO FINAL UNIT P48-3,4
TO R/O UNIT P80-0-11
TO R/O UNIT P33-6-11
TO H.UNIT JW2
FROM T.UNIT P39-3,4
FROM T.UNIT P39-1,2
TO R/O UNIT P33-6
TO H.UNIT P39
TO H.UNIT P40
TO R/O UNIT P80 1~6
TO R/O UNIT P33 1~5
U1 : CA3127E
U2, 103, 202 : TL081CP
U3 : SN74F00N
U101 : SN74LS00N
U102, 201 : SN74F74N
U104 : TC4053BP
U203 : 74LS112AN
U401 : LF13741N
U501 : TC74HC123P
U502 : NJM4558D
U701,702 : DTM-5020
Q1,2,7,8 : 2SA1206
Q3,4,15,17,108,208,403,404 : 2SC1907
Q5,6 : 2SK304(E)
Q9,10,104,204 : 2SA838(B)
Q11,18~20,22,112~114,212,214,217 220,221,410,506 : 2SC945(Q)
Q12 : 2SK117(BL)
Q13,16,218,219,401,402,505 : 2SA1005(K)
Q14,109,209,210,411 : 2SA1015(Y)
Q21,101~103,110,201~203,211,215,216 : 2SA844(D)
Q105,205 : 2SC1345(E)
Q106,206 : 2SK170(V)
Q107,207 : 2SK304(F)
Q111 : 2SA1175(F)
Q213 : μPA68H
Q405~408 : 2SD668A(C)
Q409, : 2SD880(Y)
D1~6,9,10~15,101~112,114~117, 201~210,212~215,217~222,403,412, 415,416,505~507,901 : 1SS132
D7,413 : HZS5.6J(B2)
D8,211,216 : 1SS86
D401,402 : HZ2(B3)
POWER D404~411 : 1SS83
D417 : Y10GA
D424 : MTZ30JC
D425~427 : HZ36-2C
D428 : 830-0957-05

SCHEMATIC DIAGRAM

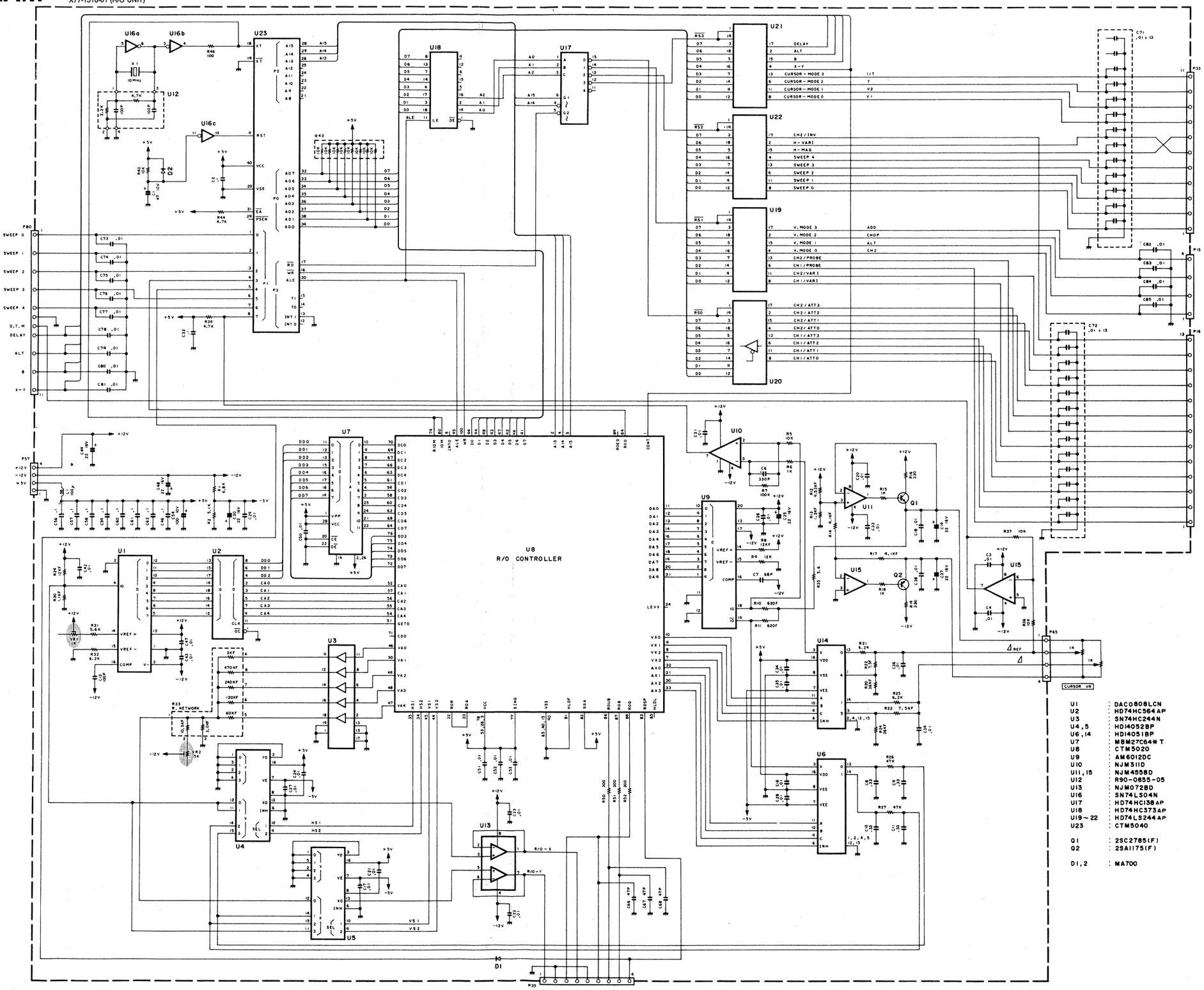
VERTICAL FINAL UNIT (X73-1840-00)



SCHEMATIC DIAGRAM

R/O UNIT (X77-1510-01)

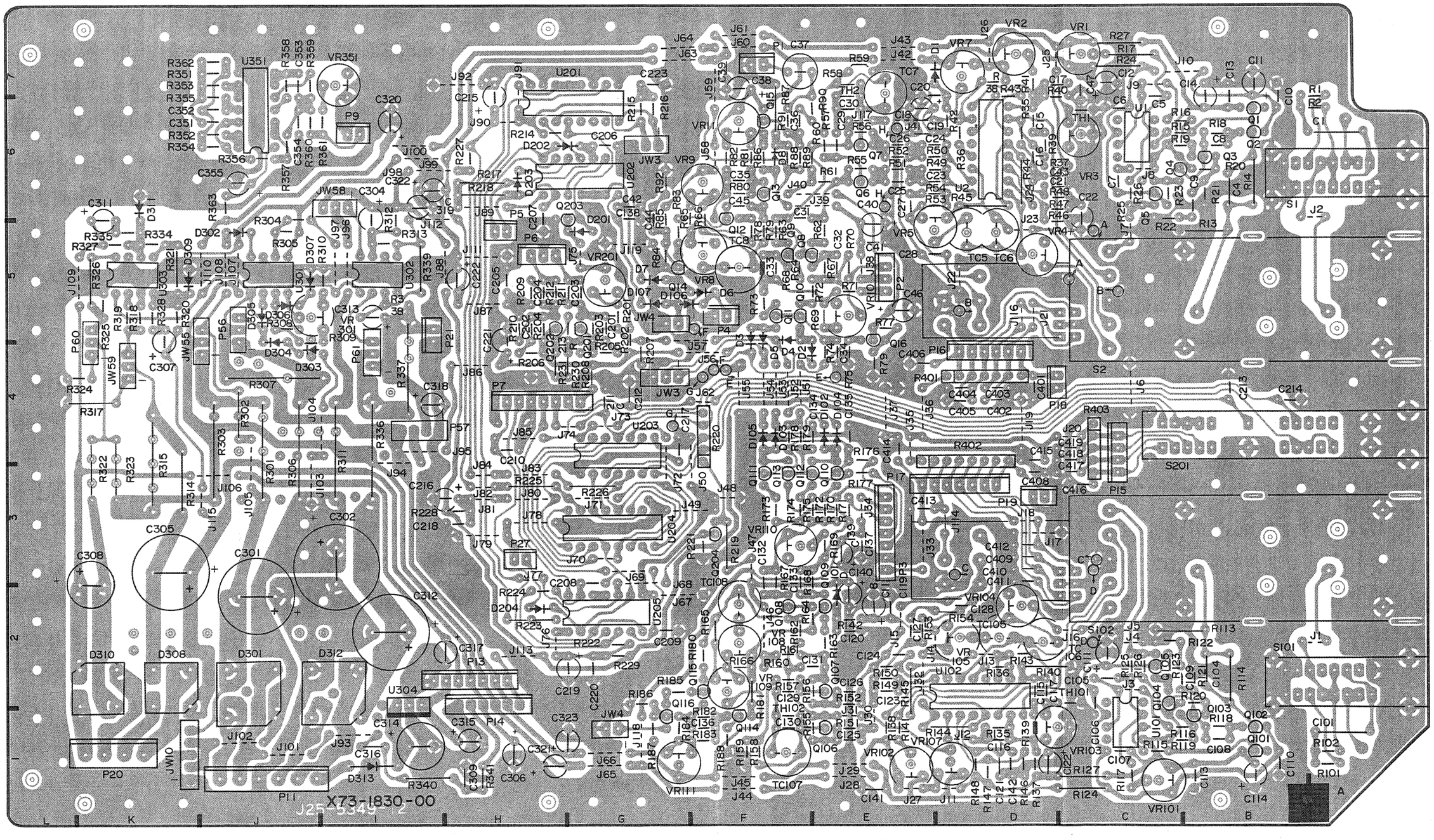
X77-1510-01 (R/O UNIT)



P.C. BOARD

VERTICAL UNIT (X73-1830-00)

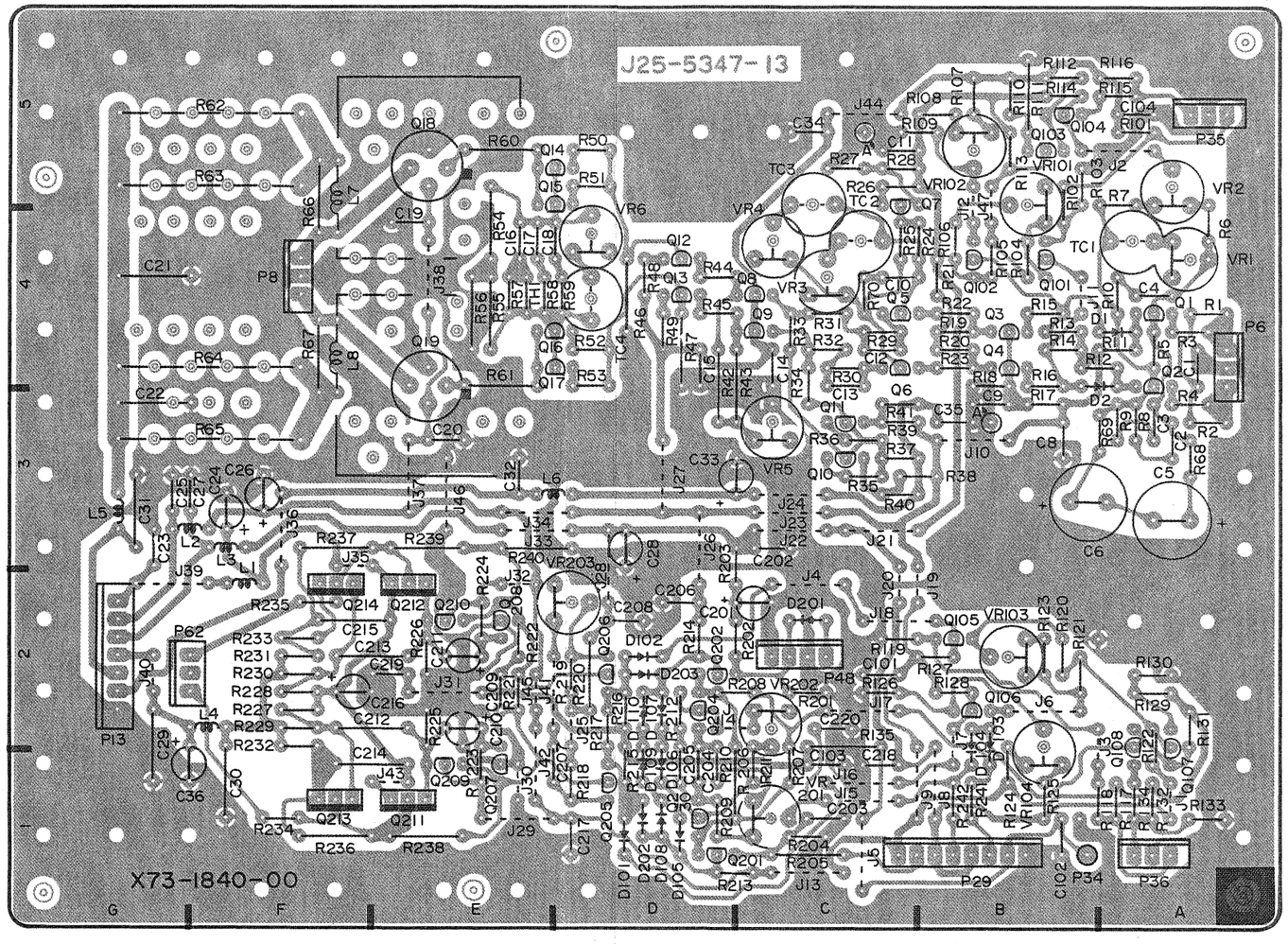
Pattern side view



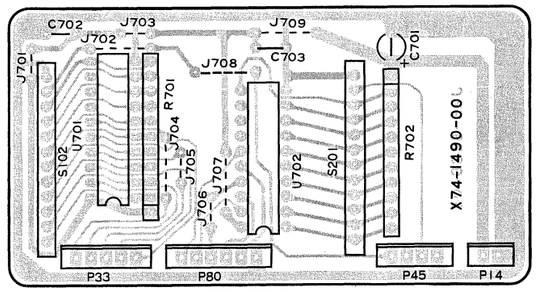
P.C. BOARD

VERTICAL FINAL UNIT (X73-1840-00)

Pattern side view

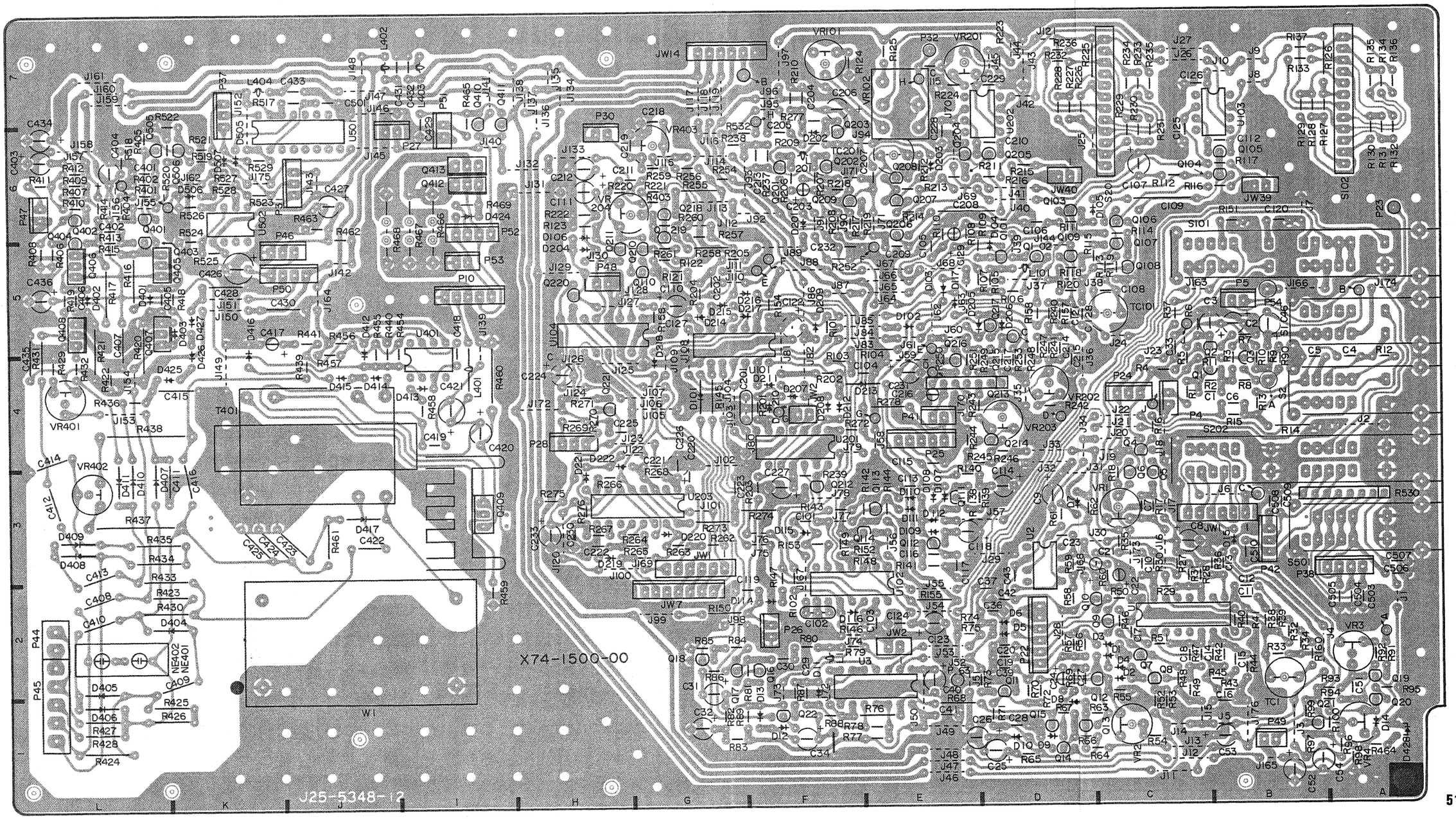


P.C. BOARD



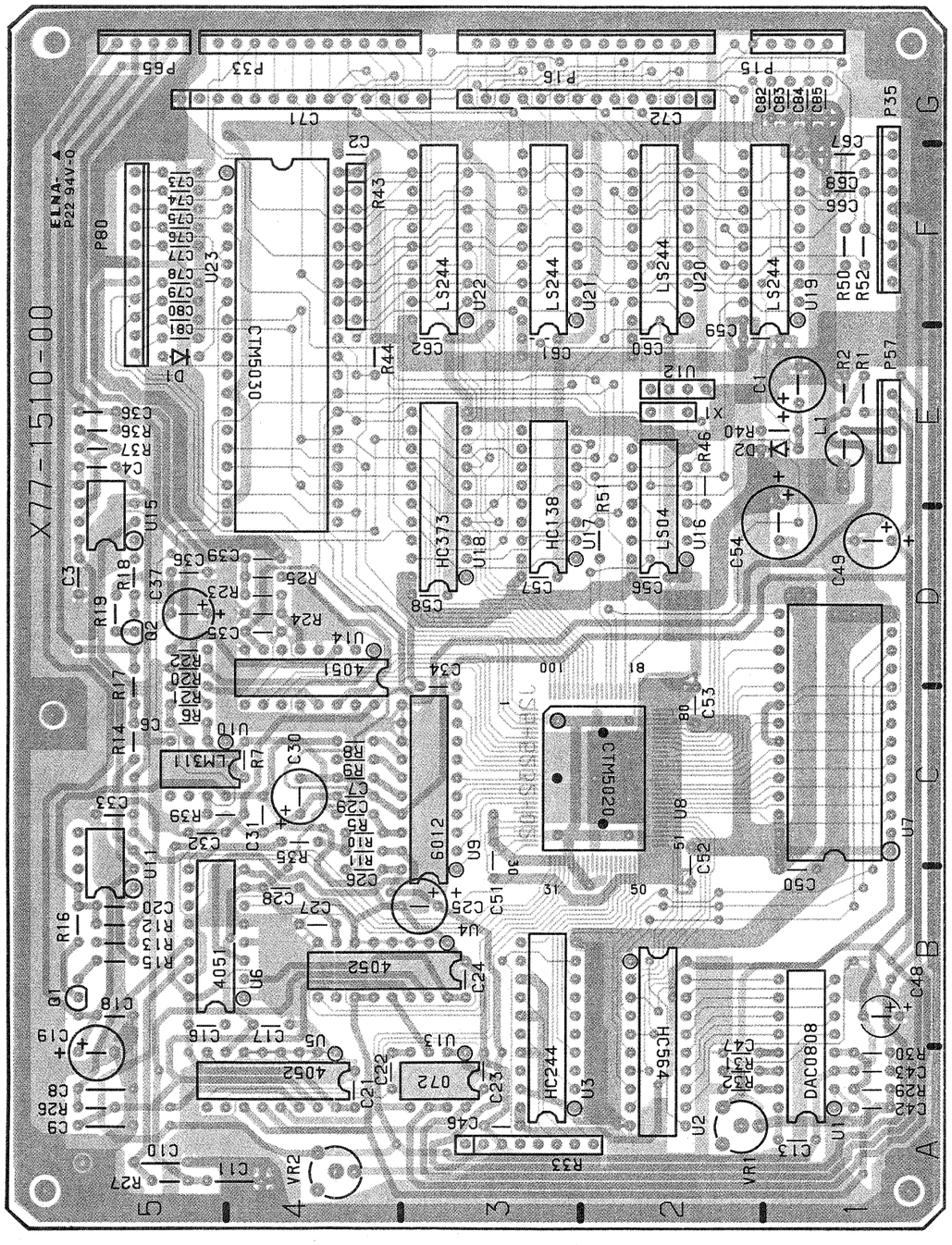
HORIZONTAL UNIT (X74-1500-00)

Pattern side view



P.C. BOARD

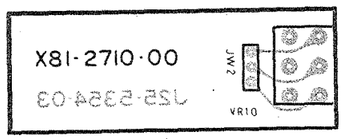
R/O UNIT (X77-1510-01)

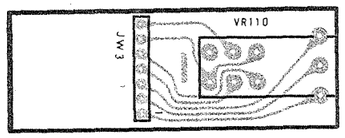


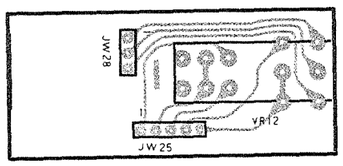
LINE FILTER UNIT (X80-1060-04)

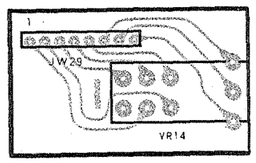
P.C. BOARD

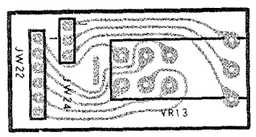
VR UNIT (X81-2710-01)



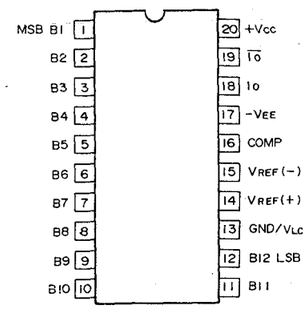




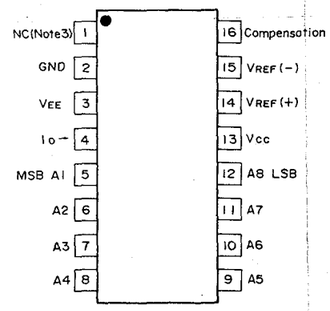




SEMICONDUCTOR



AM6012DC



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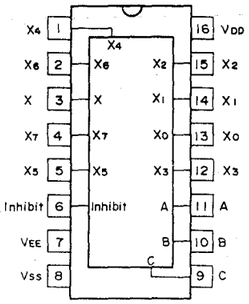
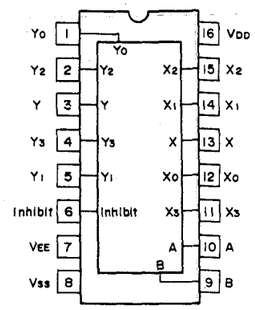


HD14051BP



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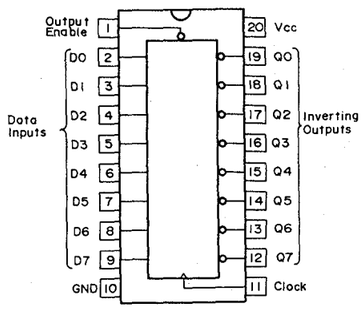

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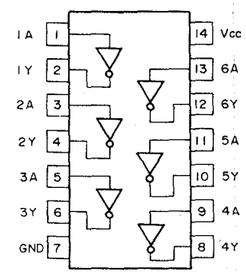
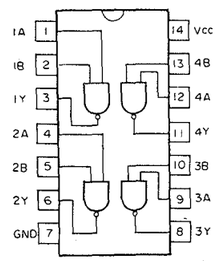
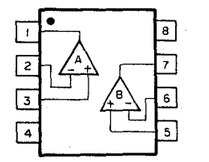


SN74LS04N



SN74F00N
SN74LS00N



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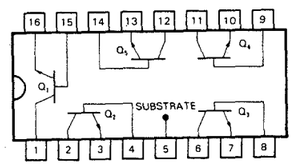
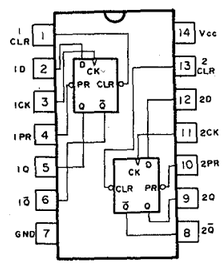


CA3127E



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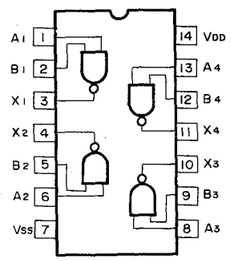
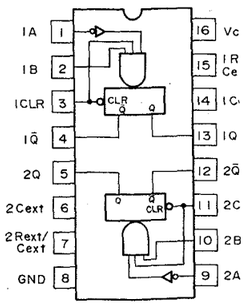


TC4011BP



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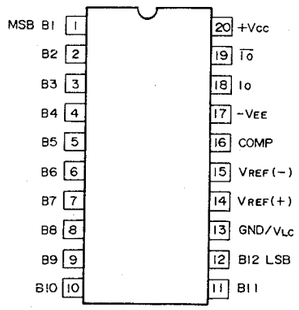

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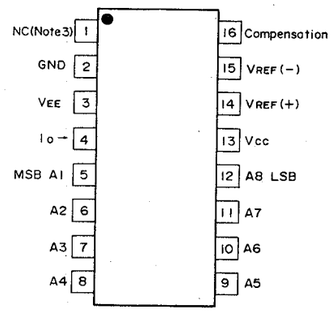

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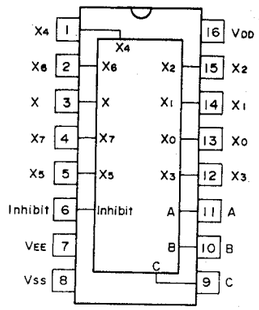

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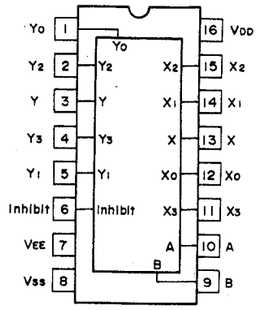

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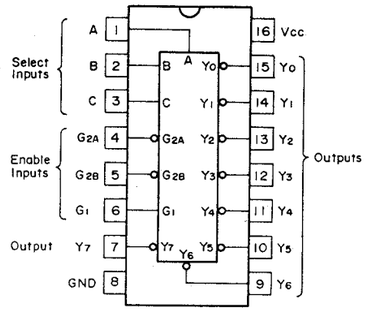

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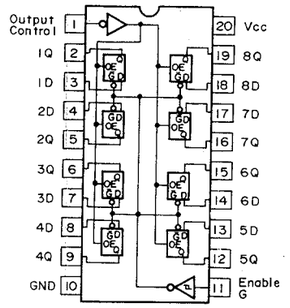

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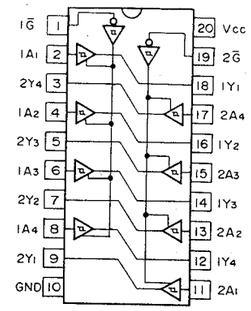

SN74LS244N
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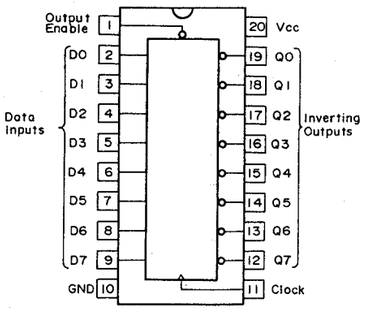

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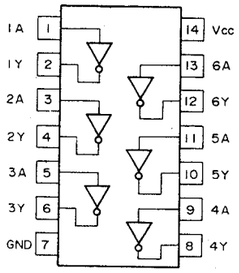

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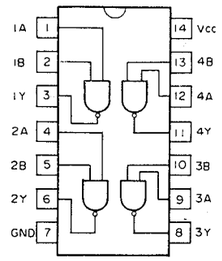
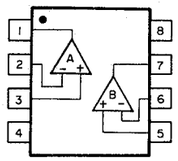
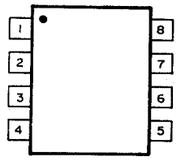


SN74FOON
SN74LSOON



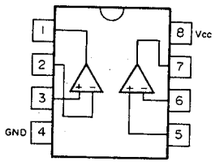
Pin name
1. A OUTPUT
2. A (−) INPUT
3. A (+) INPUT
4. V⁻
5. B (+) INPUT
6. B (−) INPUT
7. B OUTPUT
8. V⁺

NJM072BD

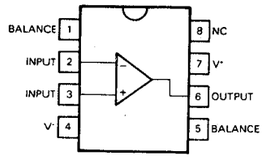


Pin name
1. GROUND
2. + INPUT
3. − INPUT
4. V⁻
5. BAL
6. BAL/STROBE
7. OUTPUT
8. V⁺

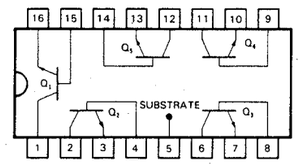
NJM311D



NJM4558D



LF411CN



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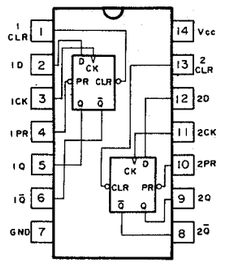

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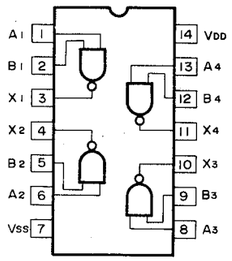
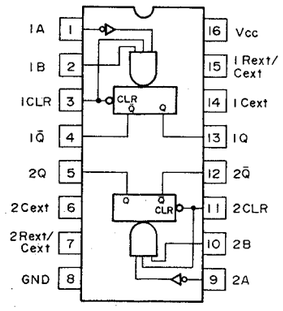


TC4011BP



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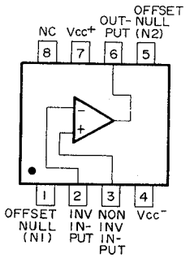
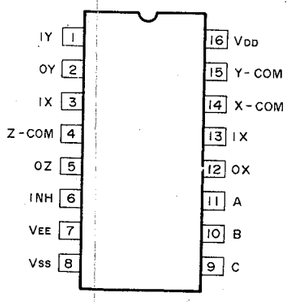
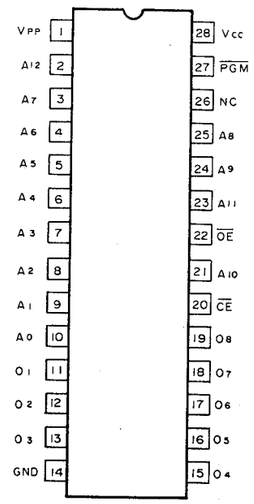


TC081CP



TC4053BP



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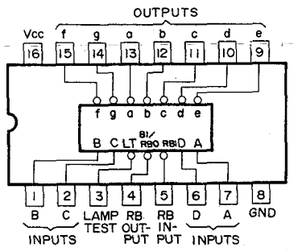
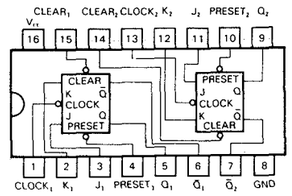

OUTPUTS
Vcc f g a b c d e
16 15 14 13 12 11 10 9
f g a b c d e
B C LT BI/RBO RBI D A
1 2 3 4 5 6 7 8
B C LAMP TEST RB OUT-PUT RB IN-PUT D A GND
INPUTS
INPUTS

SN74LS47N



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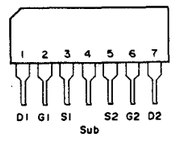
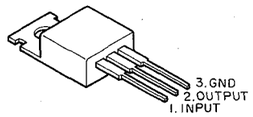
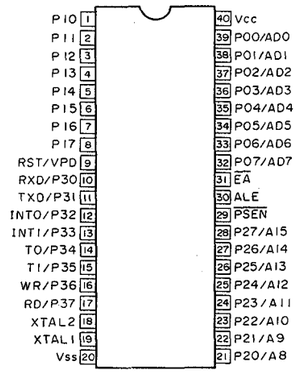


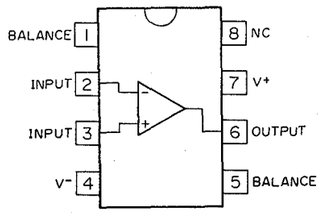
μPA68H



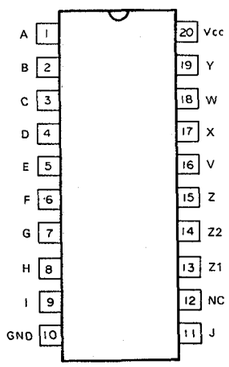
TA78020AP



CTM5040

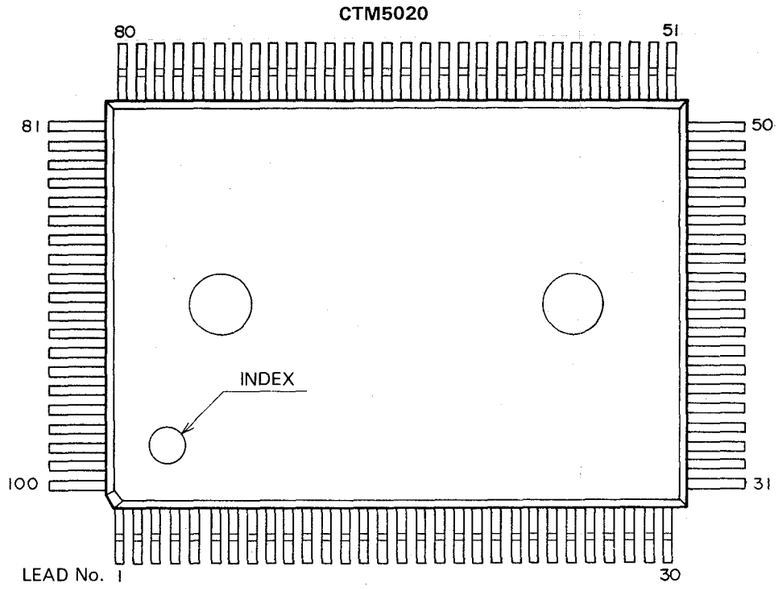


LF13741N



DTM-5020

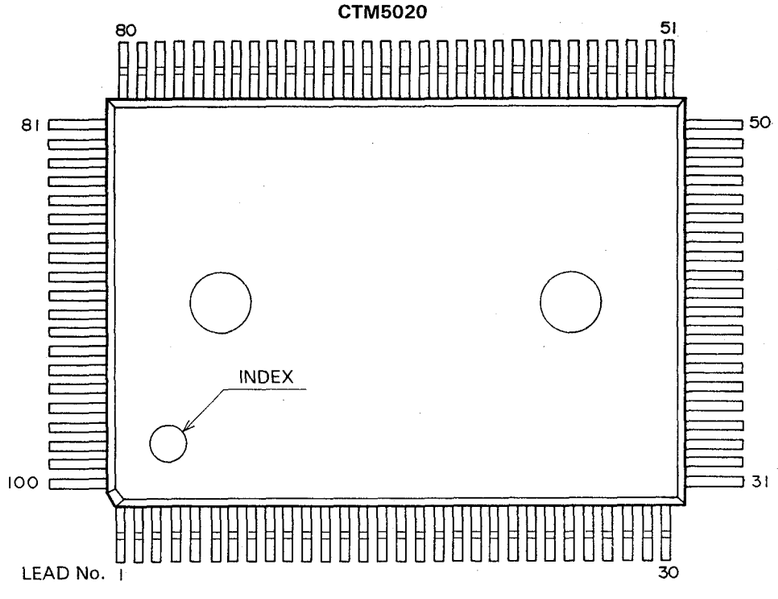
CTM5020



Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name
1	CONT	26	TSD0	51	GETD	76	DD3
2	A13	27	TSD1	52	CA0	77	SING
3	VDD	28	VDD	53	VDD	78	VDD
4	A14	29	TSD2	54	CA4	79	R10M
5	A15	30	AX2	55	CA3	80	10M
6	INT0	31	AX1	56	CA2	81	HLDF
7	VX3	32	AX0	57	CA1	82	SGA
8	VX2	33	AX3	58	CD3	83	ROSP
9	VX1	34	HS2	59	CD2	84	ROD
10	VX0	35	HS1	60	CD4	85	HLDL
11	DA0	36	TDIO	61	CD1	86	ROUB
12	DA1	37	TWE	62	CD5	87	ROB
13	DA2	38	TCK1	63	DC4	88	ROQ
14	DA3	39	TST1	64	CD7	89	ROED
15	VSS	40	VSS	65	VSS	90	VSS
16	DA4	41	TST2	66	DC3	91	D7
17	DA5	42	TADD	67	DC2	92	D5
18	DA6	43	TCK2	68	CD6	93	D3
19	DA7	44	VS2	69	DC1	94	D1
20	DA8	45	VS1	70	DC0	95	ALE
21	DA9	46	VA0	71	CD0	96	D6
22	ROR	47	VA4	72	DD7	97	D4
23	ROA	48	VA3	73	DD6	98	D2
24	LEVX	49	VA2	74	DD5	99	D0
25	TCL	50	VA1	75	DD4	100	WR

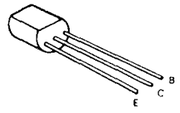
CONDUCTORS

CTM5020

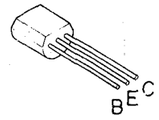


Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name
1	CONT	26	TSD0	51	GETD	76	DD3
2	A13	27	TSD1	52	CA0	77	SING
3	VDD	28	VDD	53	VDD	78	VDD
4	A14	29	TSD2	54	CA4	79	R10M
5	A15	30	AX2	55	CA3	80	10M
6	INT0	31	AX1	56	CA2	81	HLDF
7	VX3	32	AX0	57	CA1	82	SGA
8	VX2	33	AX3	58	CD3	83	ROSP
9	VX1	34	HS2	59	CD2	84	ROD
10	VX0	35	HS1	60	CD4	85	HLDL
11	DA0	36	TDIO	61	CD1	86	ROUB
12	DA1	37	TWE	62	CD5	87	ROB
13	DA2	38	TCK1	63	DC4	88	ROQ
14	DA3	39	TST1	64	CD7	89	ROED
15	VSS	40	VSS	65	VSS	90	VSS
16	DA4	41	TST2	66	DC3	91	D7
17	DA5	42	TADD	67	DC2	92	D5
18	DA6	43	TCK2	68	CD6	93	D3
19	DA7	44	VS2	69	DC1	94	D1
20	DA8	45	VS1	70	DC0	95	ALE
21	DA9	46	VA0	71	CD0	96	D6
22	ROR	47	VA4	72	DD7	97	D4
23	ROA	48	VA3	73	DD6	98	D2
24	LEVX	49	VA2	74	DD5	99	D0
25	TCL	50	VA1	75	DD4	100	WR

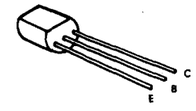
SEMICONDUCTORS



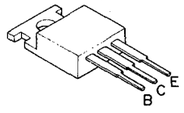
2SA844 (D)
2SA838 (B)
2SA1005 (K)
2SA1015 (Y)
2SC945 (Q)
2SC1345 (E)
2SC1907



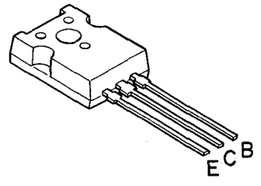
2SA1161
2SC2671
2SC3779 (D)



2SA1206 (K)



2SB834 (Y)
2SD88 (Y)



2SA1360 (Y)
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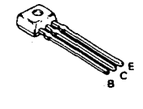
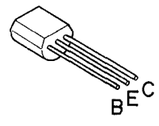


2SA1175 (F)
2SC2785 (F)



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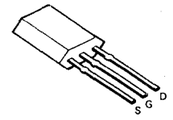

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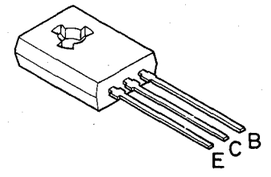
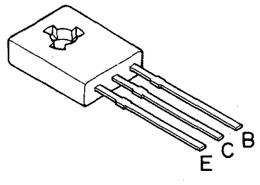


2SC1846



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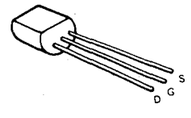

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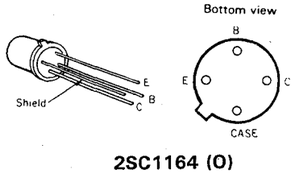

2SC1164 (O)